The Builder.

VOL. LXIII. No. 2390. SEPTEMBER 24, 1892.

ILLUSTRATIONS.

Restoration of Great East Window, Selby Abbey.—Executed, according to the Original Design, by Messrs. Ward & Hughes. ..*Extra Large Ink-Photo.*
The Hall, South Lytchett Manor, near Poole.—Mr. W. D. Caröe, M.A., Architect .....*Double-Page Photo-Lithe.*
Studio, Melbury-road; and "Mark Ash," Abinger.—Mr. John Belcher, F.R.I.B.A, Architect .....*Double-Page Ink-Photo.*

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The Curriculum of the Architectural Association for the Session 1892-93.

AFTER the stormy debates which marked the close of the last session of the Architectural Association, we turn with some interest to a perusal of the curriculum prepared by the committee for the coming winter's work, and we are pleased to note that the victorious majority have evidently shown studied moderation in the use of the power given them at the election of officers. There is no longer any ground for even the most captious critic to stigmatise the Association as a "forcing-ground" for the Institute, as direct reference to the subjects of the Institute examinations and direct instigation to members of the Association to prepare for those examinations are alike carefully eliminated from the pages of the curriculum just issued. At the same time, no member of the Association who desires to prepare for the Institute examinations can say that he is unable to obtain the instruction he requires within the walls of the society to which he belongs.

The ground now taken by the governing body of the Association evidently is that it is their duty to provide for the architectural student the best education in their power, and that, when he has availed himself of that education, he will be qualified to pass the examinations of the Institute, and it rests entirely with himself to decide whether he will submit himself to that ordeal or not. The subjects required for the examinations are still to be found in the curriculum, and adequate tuition is provided in those subjects, as in others which are considered desirable for the education of an architect.

So much concession having been made to those who think with the party in the profession whom we have learnt to call "the memorialists," we are somewhat surprised to see that amongst the names of those eminent architects who "have kindly consented to act as visitors at the meetings in the studio for the criticism of drawings," only one name, that of Mr. Basil Champneys, stands as representing the non-members of the Institute, and we think that those who, in advocating the views of "the memorialists," virtually pledged the support of some eminent outsiders, should either redeem those pledges or give to the members of the Association some good reason for their failure to make good their promises.

The need for the elasticity of arrangement and freedom of individual action which have always been amongst the most valued characteristics of Association work in the past has, doubtless, led to the most prominent alteration in the arrangement of the curriculum. Instead of dividing the subject into four "years," with the implied condition that each of these formed a rigid and inflexible part of the whole, we find that the principal subjects, or those which the committee regard as such, are grouped into four "divisions" and the remainder classed as "extra subjects." Further, this arrangement is made still more elastic by the provision that for the reduced inclusive fee of five guineas a student may, if he be so minded, choose one subject out of each of the four "divisions" and one "extra subject." We cannot but regard this latitude offered to the individual student as an admirable preventive of any undue "academic" strait-lacing, which some architects profess to regard as inseparable from organised architectural education. A student may now, if he wishes it, follow the curriculum in its four "divisions" in regular order, or he may select those subjects in which he feels most need of instruction or for which he has the greater preference. He may even, if he be so disposed, attend one only of the classes, or, on the other hand, may, subject to the exigencies of the time-table, attend the whole.

Another alteration of some importance, and one that has been wisely made, in view of the conditions under which English architectural students work, is the reduction of the time allotted each evening to lectures and classes. After a young man has been engaged in an office all day, and, presumably, diligently engaged, it is too much to expect that he will be physically and mentally capable of paying that attention which the improved quality of the instruction now given demands, for so long a time as three hours. It is, therefore, a wise course on the part of the committee to limit the period of study to two hours in lectures and classes, and we doubt not that it will be found that students learn as much—that is, assimilate and retain as much—in two hours as in three. In the studio we note that the time still remains three hours, which is reaonable, as the attention is less tensely exerted in studio work than in lecture or class, and, as we know from the experience of Academy students, a shorter evening than three hours is of very little use for the study of drawing and design.

We see that, as a rule, the evenings allotted to each subject now follow each other in quick succession, so that a student will, ordinarily, be devoting his attention to one subject at a time instead of having several in hand at once. This is directly contrary to what we remember as the conclusion to which the Education Committee, who formulated the new scheme, declared their adhesion, but we can readily understand that however desirable it may be, in ordinary schools and colleges, for students to study several subjects at once, it is otherwise with a course intended for architectural students who are devoting, so to speak, only their leisure time to attendance at lectures and classes. Dealing with each separate subject in a series of meetings at short intervals is, moreover, especially suited to the student who wishes to individualise his work and to take up one or two subjects only; and, as we have already pointed out, this type of student is apparently one that the committee wish to meet in every way. We think, however, that this rapid succession of meetings has, in some cases, been rather overdone, and that a longer interval would enable students to make better preparation for their class work than is now possible. We fear that the new arrangement will rather tend to the development of the lecture and the decrease of the class or student work, without which lectures are of very small service. We quite admit that the peculiar circumstances attending the study of architecture in this country may be of importance in this matter, and that the wisdom or otherwise of the course now adopted can only be determined by the result.

Turning now to the subjects included in the lectures and classes of the different "divisions," we see that in each "division" there are four subjects, and that by some slight alterations in the position of some subjects, and the placing of others under the heading of "extra subjects," the work in each "division" is equalised as compared with the variations between the "years" of the curriculum of last session. In Division I. we find the Orders of Greek and Roman Architecture; Elementary Construction; the Rudiments of Perspective and Elementary Physics. Of these, the first two appear, from the syllabus, to be practically the same as in last session's curriculum, but the lectures on perspective are far more practical and more suited to the requirements of architectural students than before. It seems to us rather a bold experiment to place elementary physics in Division I., which is, presumably, intended for elementary students; but, although bold, the course has nevertheless this justification, that the younger students will have forgotten less of their school training in mathematics, and will, at an early stage of their technical education, be shown that the use of formulæ and of graphical methods of treating statical problems is not so great a bugbear as it too often appears to the architectural student.

In Division II. we have lectures and classes on English Architecture; Materials; Elementary Ornament and Colour Decoration; and the Strength of Materials, Stresses, and Strains. These subjects, with some modifications, remain as in the last session's curriculum, except that the class for elementary colour decoration appears to be a continuation rather than a repetition of last year's course, it being presumed that students will remain more than one year in the class. This is certainly highly desirable, as it is beyond question impossible for anyone to obtain an adequate knowledge of even the grammar of colour decoration in one session. We cannot too much commend the care taken in the preparation of the syllabus of this class by the inclusion of a list of reference-books and places for study, emphasising, as it does, the constant necessity for individual and independent study, a necessity that exists not only with regard to colour decoration, but in all architectural scholarship.

In Division III. there are lectures and classes on The History of Architecture; Materials; Colour Decoration (advanced); and Sanitary Science (drainage and water supply). We note, with some amusement, that in the curriculum the first of these subjects is described as "The History of Architecture, *and* features, mouldings, and ornaments," as though "features, mouldings, and ornaments" were not an integral part of "the history of architecture." We trust that it will never be forgotten either by lecturers or students that the history of architecture is, emphatically, not the history of architects or of buildings, but of the expression in building of the needs, the circumstances, the opportunities, and the artistic feelings of peoples and nationalities. The late Mr. Fergusson has, in many of his writings, laid much stress on the ethnic side of architectural history, and the lines of thought and investigation which he pursued may be trusted, if they are fully worked out, to yield important results in the future. Undue prominence has, undoubtedly, been given in some of the examination papers set at the Institute on the history of architecture, to names of architects and dates of buildings. But this is not "history of architecture," and has afforded a handle for some of the detractors of the Institute and its examinations. Returning to the Association curriculum, we see that Mr. Warren no longer fills the post of instructor in colour decoration, and we are glad to be able to state that his retirement is not due to any share he may have taken in the "memorialist" controversy, but is necessitated by the lack of time at his disposal in consequence of increasing work. The loss of their instructors, through the claims of private practice, must ever be one of the disadvantages under which the Association labours, as long as the post of instructor is filled, as at present, by those whose ability is superior to the emoluments which the Association can offer. Looking down the list of lecturers and instructors we cannot find one whose time would not be better occupied, from a pecuniary point of view, if he were not assisting in the educational work of the Association.

In Division IV. we find lectures and classes on the History of Architecture (in continuation of those in Division III.); Sanitary Science (ventilation, lighting, and heating); Painting, Sculpture, and other Arts allied to Architecture and Professional Practice. When we mention that amongst the lecturers in this division are to be found the names of Mr. T. Stirling Lee, Mr. Walter Crane, and Mr. E. T. Hall, we feel justified in what we have said as to the calibre of the instructors of the Architectural Association.

The "extra subjects" include Plane and Solid Geometry, Geology, Mensuration, Land Surveying and Levelling, Chemistry of Building Materials, and Quantity Surveying, of all of which it may justly be said that, whilst eminently desirable for the complete education of an architect, they can hardly be described as absolutely necessary. The Committee have, therefore, acted wisely in so arranging these subjects that students may select which they please, and may take up their study at any period of their training that best suits them.

Turning now to the Studio, we find that this, which has proved so successful an innovation in the work of the Association, is to be continued on practically the same lines as before, though here, as in the lectures and classes, there are as "extra subjects," Sketching and Measuring; Elementary Water Colour; Water Colour (advanced); and Modelling; in respect of which students at any stage are allowed free choice. There is one matter in connexion with the Studio on which we feel compelled to speak otherwise than in terms of praise. We refer to what are termed "meetings for the exhibition and criticism of the students' drawings." These are intended to fill the place of the old Classes of Design, which have from the earliest days of the Association been vital parts of its work, and the apparent loss of which has been deeply regretted by many of the students as well as by older members of the Association who have passed that stage. Practically, we believe that these criticism meetings have been almost entirely confined to those who are actually working in the Studio, and we know of several members who, although they do not wish to make full use of the Studio, would be exceedingly glad to work on the lines of the former Classes of Design, preparing their drawings at their own homes, and then bringing them up for criticism and discussion. The desire of these members might be easily gratified by the publication in the Brown Book of the dates of the criticism meetings, and particulars of the subjects for which designs were to be prepared.

One of the blemishes in the generally exlent curriculum of the Association is the lack of opportunity for the discussion of artistic matters amongst students of the same age and capabilities, other than that afforded by the general meetings, the necessary formality and publicity of which are rather deterrent to younger members. The successful and invaluable Discussion Section does not meet the case, for of the twelve subjects to be there considered two only are definitely concerned with the artistic and æsthetic side of architecture.

We see that the Committee have not yet decided to institute either day classes or handicraft teaching, and we think they are quite wise not to attempt either of these, at any rate for the present. Their ship is quite sufficiently loaded, and however desirable instruction in handicrafts may be,—in the opinion of some,—for the young architect, it is difficult to see how these can be managed as a part of architectural training, until architects, as a body, are more ready to allow their pupils time during office hours to attend at classes. At present the young architect who has time and inclination for learning handicraft, can avail himself of the classes intended primarily for the improvement of young workmen, whether at the various Polytechnic institutions now becoming fashionable, or at the more æsthetic Guild and School of Handicraft. It is, indeed, quite open to question whether the Architectural Association would not do well to leave the teaching of handicraft entirely to such institutions, and content themselves with that which they have so well undertaken,—the technical instruction of architects.

A careful perusal of the curriculum we have been noticing can hardly fail to show that, at the Architectural Association, any young man of average industry and ability can find ample instruction of the very best quality to enable him to become a qualified and capable architect, whether or not he intends to pass the examinations of the Institute. We cannot conclude without saying a word as to the scale of fees. When we see that for the sum of forty guineas an architectural student can obtain four years' thorough instruction, both in studio and in lectures, we cannot help feeling that he is in far more favourable circumstances than those in his own station of life who intend to enter the professions of law, medicine, or the Church.

FURTHER CORRESPONDENCE ON THE INSTITUTE.

THE correspondence in regard to "The Institute and Architecture," printed on another page, throws some further light on the situation.

It is satisfactory to find that an architect like Mr. Ernest George not only sees no bugbear in the idea of the examination of candidates for associateship in respect of their practical knowledge, but also recognises that a student may reasonably be examined in design, "as a test of his capacity to put his ideas on paper, or in other words to express himself grammatically." It is somewhat significant to have this important admission from Mr. Ernest George, since it cannot possibly be pretended by the critics of the Institute that he does not represent the artistic side of architecture, or that he is a mere surveyor desirous to see architecture treated as a business. Mr. George recognises also the value of an examination as laying down a course of study for the student, and giving an aim and purpose to his work; a view of the matter which was forcibly expressed in a letter in our columns some months ago by a young architect who declared that the Institute examination programme was the first real and efficient guide to his studies that he had, and that in his opinion it would be "a boon to thousands."

We also recommend to our readers the judicious letter of Professor Roger Smith in regard to the question of requiring Fellows also to pass an examination for election. He recognises entirely what we have already pointed out, that such a course would be an anomaly in such a society as the Institute, and suggests a course by which candidates for Fellowship who have not entered the Institute through the door of the Associateship examination should be recommended for election on the basis of their known works. This recommendation seems to fall in with the idea already suggested by some others of our correspondents, that election to the position of a Fellow should be an honour conferred as a recognition of excellence, and not a mere right to be claimed after so many years' practice as an architect. There is a good deal to be said for this idea, which would certainly tend to raise the standard of future Fellows of the Institute, and to render the honour of election as a Fellow more valuable. But if Fellowship is to be a distinction, it must be one conferred on broad lines, for distinguished excellence in planning and construction of buildings for prac-

tical purposes, as well as for the designing of picturesque architecture, or what is supposed (sometimes unnecessarily) to be such. We fear that some of those who wish the title of Fellow to be conferred as a distinction, would, if they had their own way, confine the distinction to those whose ideas of artistic design in architecture coincide with a rather narrow standard of their own,—a standard which sometimes is in reality (though they may not perceive that) rather a matter of fashion than of serious æsthetic consideration.

In fact, at the root of all this disagreement lies the forgetfulness of the truth that architecture, save in some exceptional cases, is not a pure art, but a pursuit involving serious practical problems, in the proper treatment of which public convenience and public safety are largely concerned. Mr. Jackson's position, as represented in his letter, would be a perfectly defensible and logical one if architecture were a pure art like sculpture and painting —which it is not. Mr. Jackson says he and his friends want nothing, they only want to be let alone, and that it is the Institute who are the aggressors. That surely can only be said in a technical sense, if at all. Those who were present at the reading of Mr. Jackson's paper at the Architectural Association last season, and at the discussion which followed it, and who took note of the acrimonious and bitter things that were said, and of the temper of some of the speakers, must surely have thought that Mr. Jackson's allies, at all events, were very "aggressive" people indeed; and we should imagine that architects from France or Germany, if any had been present, would have found it hard to understand that all this indignation was directed against an institution which had committed no other crime than endeavouring to ensure that architects entering its ranks and bearing its *imprimatur* should have shown that they possessed adequate practical knowledge of their craft, and indicating a course of study for architectural students. As we have already said, we believe that those who regard this attempt with contempt and indignation stand entirely alone in the world, and that their feelings would be quite incomprehensible among architects anywhere out of this country.

In short, it appears to us that the indignation aroused against the Institute on account of its examination scheme is one of the most whimsical incidents in the whole curious history of architectural parties in this country. Mr. Jackson says it will prevent all who take a serious view of architecture from joining the ranks of the Institute. What is a "serious view" of architecture? It seems to us that the most "serious" view possible is that which regards architecture as the art of planning and constructing healthful and convenient buildings further dignified and embellished by artistic expression and detail, and that the view that any one who feels the power of giving artistic expression to building should *ipso facto* be recognised as an architect is a view very deficient in seriousness. Mr. Jackson further points out that by adhering to its policy the Institute has lost its men of the greatest promise. Let us say "*some* of its men of the greatest promise." We admit that the secession of the gentlemen named is an injury to the Institute, a consideration which seems to be rather a matter of gratification to them and their friends. Might we suggest to them to consider, not what harm they have done to the Institute, but what good they have done to architecture, by seceding. They could have done good by remaining in the Institute and helping to make it all it ought to be and might be. They have given up the opportunity now, with no advantage to any one that we can see except affording themselves the opportunity for a display of what we venture to think a rather impracticable spirit of opposition, and the public the spectacle of a house divided against itself.

As to Mr. Jackson's final criticism, we did not intend to quote Wren's official title of "Surveyor to the Fabric" quite seriously, or to represent it as meaning exactly the same as "surveyor" in the present; still it is a kind of title which savours more of business than of art, and is rather more significant in that sense than Mr. Jackson seems to admit. We were thinking however not so much of Wren's title as of Wren himself, who was essentially a practical man in little and great things connected with building; a mathematician too, who applied his mathematics to architecture both in regard to construction and design; but all this did not prevent his being a building artist in the fullest sense of the term. He took, in fact, a "serious" view of architecture in every sense of the word, yet if he were living now we imagine he would be on the side of the Institute.

NOTES.

IN a letter to the *Times* of the 19th Mr. C. F. Hayward, as District Surveyor for St. Giles and Bloomsbury, calls attention, in connexion with the recent fire in Montague-place, to the danger to the British Museum from the combustible sheds and other buildings which are ranged against the garden-walls of the houses, on the Museum ground, and in near proximity to the main building. The British Museum is one of the buildings exempt from control under the Building Act. The danger is perhaps not a very serious one, considering the solid construction of the Museum itself, but the question suggests itself whether there is not an ultimate possibility of clearing some of the ground near the Museum of houses and their outbuildings, and giving space for the extension of the Museum and its enclosure. There can be no doubt that the Museum is greatly cramped for space at present, a difficulty which is not likely to diminish. Some public money might be well expended in purchasing property to clear the Museum and give it space for safety and for future extension.

IN the Mineralogical Department of the New Natural History Museum at Vienna, the visitor finds a separate collection labelled "Building Materials." This summer, a catalogue to this collection has been printed, and, with the aid of this excellent little publication, one is now able to obtain a thorough insight into Austria's resources, and also, to a certain extent, of the resources of the world. The collection, as we now find it, is an extension of a small one which Herr Felix Karrer began to arrange in 1878, with the purpose of showing the different materials used in the many monumental buildings being put up in Vienna during the last two decades. It includes some seven thousand specimens, and has been divided into groups according to the countries or districts represented, and then into sub-divisions according to the purposes for which the materials were used, commencing (1) with the different kinds of gravels and ballast used for road-making, (2) the stones suitable for pavements, then (3) the raw material which is turned into bricks, (5) into lime, and (6) into cement, and further (4) the different kinds of sands used in mortar, then continuing with (7) freestone, (8) decorative stone, (9) slate, and finishing with (10) artificial stones. Whilst all specimens of loose materials are exhibited on small trays, the stones proper and artificial stones are shown in small blocks measuring 12 by 8 by 3 centimètres, a size far more practical than the heavy and ungainly cubes of 10 cm. which are to be found in similar collections in Budapest, in Washington, and elsewhere. Of the non-Austrian countries, Germany, Italy, France, Belgium, and the United States make the best show, and England the worst, only having some forty exhibits in the cases allotted to her. This dearth of specimens in the English subdivision is entirely due to the lack of contributions from public institutions and trade magnates. Professor Rupert Jones is apparently the only English scientist who has, to any extent, aided the efforts of the organisers of the collection, and Messrs. Dunnill & Co., of Jackfield, the only representatives of the trades. The catalogue is a model one, clear, concise, and well printed, giving the position, name, and exact part of a building where any of the more important specimens shown in the collection can be seen in Vienna, and ought to be a boon to the local architects and professional visitors. A chapter in the Italian division of the catalogue bearing the title "Ancient Rome" shows that the Building Materials Collection of the Vienna Museum deserves the attention also of the archæologist.

THERE is to be a special exhibition of library architecture at the Chicago Exhibition, and Mr. James D. Brown, Librarian of the Clerkenwell Public Library, writes to us that he has been requested by the Chairman of the Library Architecture Committee at Chicago to form a collection of British library plans for this department of the Exhibition. Mr. Brown wishes through our columns to invite contributions from architects who have designed library buildings in this country. The exhibit of plans is intended to be as practical as possible, and for this reason only floor-plans, showing existing arrangements of shelving, tables, counters, racks, &c., are desired. It is, therefore, suggested that floor-plans drawn to a $\frac{1}{4}$-in. scale, be sent, and that only the part of the library used for work be shown. This may, however, include museums or art schools where worked along with the library. Photographs or drawings of elevations may also be sent if thought necessary, and any point which may be considered new or uncommon in regard to construction or arrangement might be emphasised. It is intended to publish a report on the library plans represented at the Exhibition, and it is hoped that the results of such a great international collection may be preserved in a manner likely to prove of great use in the future. Mr. Brown will give any further information desired by intending contributors, and plans proposed to be shown should be sent to him at the Clerkenwell Public Library not later than Christmas.

A CORRESPONDENT last week suggested that architects should write on their drawings, "Copyrighted by ——," in order to keep the copyright in their own hands. But it is obvious that if the law assumes that the legal right to the drawings is in the employer and not in the architect, the mere fact of writing these words on the drawings would not reserve the right unless the employer agreed to the reservation. Silence does not give a consent in law, and if a dispute arose in regard to the ownership of such drawings, the mere fact that these words were on them, and that the employer did not assert his right by any actual words, would not justify a court of law in saying that he had parted with the assumed right. The fact is that, having regard to the state of the law, an architect can only make sure of keeping a right to the drawings in his own hands by informing his employer at the time when he receives the commission that he will retain the copyright himself. It will be observed that in what we have here said we have drawn no distinction between preliminary drawings and approved final drawings. But it is obvious that there is a fundamental legal distinction between the two cases, and the very principle of the rule by which final drawings become the property of the employer appears to militate against preliminary and unapproved drawings being considered the property of the employer. The object of this note, however, is to point out the futility in law of the words "copyrighted by ——," and not to discuss the question of copyright or the case of Sir Charles Barry and the Government, the importance of which from a legal point of view has probably been much overrated by the architectural profession.

THE run upon the Birkbeck Bank last week was no doubt ludicrous, but it was more pitiful than amusing. The collapse of the Liberator Building Society had scared a large number of persons who invested their savings in building societies, and, the Birkbeck Bank being connected with the Birkbeck Building Society, a very small and quite unfounded rumour was enough to send scores of persons already alarmed to withdraw their money. But it shows the amount of distress which the collapse of a building society creates; it destroys in a day the savings of years of a class of persons who have the most difficulty in putting by money, and it creates a widespread distrust. In many respects there never was a worse form of investment for the earnings of clerks and others than that of a building society. Because there must always be a considerable amount of risk in respect of even those which are the best managed. Well-meaning judgment will not always insure success in regard to operations in connexion with land and buildings. No doubt building societies appeal to various dominant instincts,—to the love of thrift and to the love of gambling,—and we suppose they will always remain more or less popular. But every year it becomes more and more clear that the prudent investor of small means must continually exercise personal caution and constant supervision over any society in which he may have placed his savings, and this is usually what he cannot do. We can only hope that the cases of the Liberator Building Society, and of the Glamorganshire and London Provident Building Societies, which are the two last examples, in one instance of fraud, and in the other of "non-liquid" investment, will so brace up public opinion that before another season elapses some stringent legislation may take place which will make these societies more secure. On the other hand, no legislation can prevent over-sanguine managers from over-rating their societies, and no audit can tell to a nicety the realisability of assets.

THE old room which formed one of the late Lady Hill's apartments in Hampton Court, and is now to be opened to the public, is, we understand, that known as "Wolsey's Closet," between the eastern side of the Inner, or Clock-court, and the Communication, or Mantegna, Gallery, overlooking Fountain-court. Reduced in dimension, it retains many of its original features. It has an inner closet, made in the wall, a Tudor fireplace, and its original mullioned window. Mr. Ernest Law, in his well-known work upon the Palace, gives an illustration of the interior, and says:—

"The ceiling, however, is the chief point of interest, and is very beautiful, being of pure cinquecento design in octagonal panels, with decorative scroll-work and other ornaments in relief. The ribs are of moulded wood, with balls and leaden leaves at their intersections; these and the ornamental work within the panels are gilt, the ground being of light blue. . . . Round the upper portion of the walls, on two sides, is a finely-wrought cornice or frieze, in the same style as the ceiling . . . . [which] certainly formed part of the original decoration of Wolsey's Palace, for it is emblazoned with his motto. . . . Below are several long narrow panels, painted in oils, somewhat in the style of Primaticcio, with subjects from the Passion."

The Cardinal's own rooms, which he embellished in sumptuous fashion, lie along the southern side of Clock-court; they are partly concealed by the Ionic colonnade which Wren erected to cover the entrance into his King's grand staircase. These are privately occupied: one, lighted by an oriel window towards the court, has a fine ceiling with wooden ribs and papier-mâché ornamentation; the panelling of two others exhibits two different examples of the linen-fold kind; whilst the ribbed ceiling of another displays the Cardinal's hat, crossed pole-axes, and his other badges. These, looking out upon the old Pond-garden and the later vinery, now stand at about midway of the palace south front: see the view published in the *Builder* of July 25, 1885. King Henry VIII.'s apartments formed the Clock-court's eastern side; beyond lay Cloister Green-court, with the King's and the Queen's "New Lodgings," all pulled down *temp.* William III., and replaced with the apartments around Fountain-court, to many of which the public have had access for fifty years past. Additional interest attaches to the block we describe as having been occupied, it is believed, by Charles I. during nearly three months, where he negotiated with Cromwell, Ireton, and Fairfax, the army being stationed at Putney; was visited by his children; and whence he escaped from surveillance on November 11, 1647, with John Ashburnham, Major Legge, and Sir John Berkeley, to the Isle of Wight. On March 24, 1888, we published Mr. P. L. Marks's measured drawings of two elevations, with details, of Fountain-court; and on October 17 last year Mr. W. Wonnacott's measured drawings of Henry VIII.'s great hall. Last winter they replanted turf in the Base-court (Basse-court) in place of the large white cobble-stones, which William III. laid there.

THE Richmond branch of the Selborne Society are minded to provide a memorial to James Thomson more worthy of him than the board—inscribed with some verses from "Summer"—in the grounds of Pembroke Lodge. Thomson lived for many years at Rossdale, a little cottage on the outskirts of Old Deer Park, in the lane that led from the upper end of Richmond-green through what was Park-shot, to Kew Foot-lane; and there he died on August 22, 1748. George Ross, an army agent, bought the cottage out of respect for the poet's memory; added rooms to it, and a garden, in which he planted some choice exotics. Having passed to Admiral Boscawen's widow, and then to Lord Shaftesbury, it was adapted, in 1866, for purposes of the local hospital. Thomson was buried at the west end, north aisle, of the parish church, where Lord Buchan (in addition to the annual commemoration he instituted at Ednam, the poet's native place) set up, in 1792, a brass tablet, bearing an appropriate quotation from "Winter." The monument, with bust, in Westminster Abbey, was set up in 1762, from the proceeds of a subscription edition of his works.

A SCHEME for the purchase of the open space now used at Earl's Court for exhibition, as a public park, appears to be in the air. There is no doubt that it would be a great public advantage if this land could be utilised for this purpose. From a purely financial point of view it would well repay the owners of houses in this district to combine to purchase this land, as it would greatly improve the district as a residential neighbourhood. Although South Kensington and Brompton are crowded with what builders have jocularly called "gardens," these are, in most instances, comparatively narrow streets, and one great drawback to this part of London is the absence of any large open public park or gardens. We have some doubt, however, whether sufficient energy and organisation will be given to this scheme, and we should not be surprised to see this space remain an Exhibition ground for some time to come. But nothing would do more for the health of this district, or tend more to raise its somewhat declining favour as a place of residence, than a park at Earl's Court.

THE sanitary condition of the Aylesbury Rural Sanitary District has been the subject of a report by Dr. Theodore Thomson to the Local Government Board, dated August 8; and a very delightful district this seems to be:—

"The large majority of the dwellings in the district are cottages, of which the old thatched or tiled cottages are very commonly unfit for human habitation. The state of dilapidation of these cottages is in some instances so great that they can only fitly be described as ruinous, and into these and many others less seriously dilapidated, rain finds its way through the roof. . . .

In certain villages the demand created for houses is such that no landlord has ever any difficulty in letting his cottages, however bad they may be; and hence in the absence of due control over their condition by the sanitary authority, these habitations are not kept in proper repair by the worse class of landlords. As a further result, one of the present difficulties in the way of closing houses that are unfit for habitation is, as was pointed out to me by the officers of the Sanitary Authority, that such action in many instances means entirely depriving the family so expelled of house shelter, there being no dwelling to let in the neighbourhood. . . .

Throughout the greater part of the district the prevailing method of excrement disposal is by privies connected with cesspits. These cesspits, generally about 2 ft. deep, and with a superficial area of eight or nine square feet, are constructed of brick, and are usually very loosely covered or entirely uncovered, permitting the entrance of rain and surface water. No ashes or other material are thrown on the excreta; and the decomposing mass of semi-liquid filth which the cesspits commonly contain is very offensive.

As the walls of these receptacles are not water-tight, leakage is liable to occur into the surrounding soil or into ditches, when, as sometimes happens, privies are situated on their banks. . . .

The cleansing of cesspit privies is not undertaken or contracted for by the Sanitary Authority. This duty is cast on the occupier; and, in the event of his failing to perform it, he is liable to be called on by the Sanitary Authority to cause his cesspit to be cleansed within a given period. In many instances, however, I found these cesspits full, and even overflowing. . . .

The privy structures are sometimes of brick, sometimes of wood; and are in many instances so ruinous as to be unsafe. They are situated in the yards attached to the houses, and very often they are close to or actually abutting on the dwellings. . . .

Save in the strictly rural part of the district, and in the smaller villages, in which there are no covered drains, public sewers are represented by stretches of rubble drains, alternating with brick barrel drains, glazed pipe drains, and porous unsocketed pipes. These are often laid at improper angles and with too sudden changes of gradient, and also without sufficient regard to the amount of surface water and sewage to be conveyed by them. . . .

The greater part of the water supply in the district is from shallow wells sunk in the clay; a few wells only are sunk in the rock, sometimes to a depth of 60 ft. to 80 ft. The superficial soil through which wells of both sorts pass is very frequently contaminated by privy soakage and pig-sty drainage, while the surface of the ground about wells is often littered with vegetable refuse, manure, fowl excrement, and other filth. Almost all wells, whether lined with stone or brick, are merely dry-steined, so that percolation from the surrounding soil, with constant risk of contamination of the supply, is liable to occur. . . .

Several cottages at Aston Clinton are not provided with any water, and the occupants of these obtain their domestic supply from the brook that runs through the village. This brook is contaminated by farmyard, cesspool, sink, and slaughter-house drainage, and is further fouled by the large numbers of ducks which dabble in it."

THE recent competition for Llanelly Town Hall seems to have ended not very creditably to the authorities. The assessor, Mr. Charles Barry, adjudged the first premium to the design of Messrs. Simon & Tweedie, and the second to that of Mr. Griffiths. At a meeting of the Council a member at once proposed, at the outset of the proceedings, that the recommendation of the assessor should be set aside and that Mr. Griffiths should be commissioned to carry out the building; and in spite of the representations of two other members of the Council, who proposed and seconded an amendment that they should adopt the recommendation of the assessor, and urged that the first premiated plans were the best on many points, the proposal to engage the architect who had been placed second was carried by a majority of eleven to four. No sufficient or direct reason was assigned for this procedure, but when it is mentioned that the second premiated architect was a local man, and was willing to undertake the work at a commission of four per cent. instead of five per cent., most readers who understand the ways of small corporations in these matters will think there is no need to look further for an explanation.

WE find that in speaking of Mr. Brownell's article on "French Art" in *Scribner's Magazine*, under the heading of "Magazines and Reviews" (*Builder*, September 10), we missed the most remarkable point in the article. One of the darling objects of

American art-critics nowadays is to exalt everything French and depreciate everything English, and accordingly it is not surprising to find Mr. Brownell exalting Claude above Turner, and speaking of the "unlucky ambition" of the latter in desiring to have one of his pictures hung next to the finest Claude in the National Gallery. But behold, among the illustrations to the article is an engraving of that very picture of Turner's, which he desired to have hung in this ambitious position, with the title printed under it, "Dido Building Carthage: *Claude*" (!). We congratulate the American critic on this evidence of his profound insight into Turner's weakness and Claude's superiority, and can only apologise for being so late in doing justice to it.

THE SANITARY CONGRESS.

WE continue our report* of the proceedings of the thirteenth Congress of the Sanitary Institute, which has been held at Portsmouth. After the five conferences which concluded on Tuesday night the rest of the work was divided between three sections: Section I. Sanitary Science and Preventive Medicine, presided over by Professor J. Lane Notter; Section II. Engineering and Architecture, presided over by Mr. James Lemon, C.E. and F.R.I.B.A. (Mayor of Southampton); and Section III. Chemistry, Meteorology, and Geology, presided over by Dr. W. J. Russell, F.R.S., &c.

Engineering and Architecture.

This section held its first sitting on Thursday morning, when Mr. Lemon delivered an inaugural address in which he sketched the progress of sanitary engineering. It was, he said, a modern science, which had originated since the passing of the Towns Improvement Act of 1847, and the Public Health Act of 1848, in investigations made by medical men into the causes of zymotic diseases in towns. It was found that want of efficient sewerage, defective house drainage, pollution of drinking-wells, badly-constructed dwellings, and want of ventilation were among the main causes of the high death-rate. The medical profession had always been pioneers in sanitary reform, and when they proved that certain diseases were preventable, public opinion was gradually roused, and eventually the sanitary engineer was created. The first engineers, of course, made mistakes, but English perseverance came in, and to-day England held the front rank, with only one competitor,—America,—nearly abreast. The available fall for the drainage and the available supply of water were the first two points to be considered in the sewerage of a town. There was a tendency to make a more liberal provision for the water-supply per head per diem than was thought necessary a few years ago. Water-closets were becoming more general, and baths in small houses more common. In Southampton houses letting at only 26*l.* per annum were provided with baths, and in some cases workmen's dwellings of only 16*l.* rent were similarly provided. Sewers were better flushed, roads were more frequently watered, urinals, courts, channels, and gulleys flushed down. This all meant more water, and with it a higher state of cleanliness and improved health. In small towns 20 to 25 gallons per head was sufficient; but in towns of 50,000 and upwards 30 gallons per head should be provided. Subsequently referring to the principles to be kept in view as regards sewerage, it was recommended that all sewers should, if practicable, have a self-cleansing velocity. Sir Frederick Bramwell had allowed for a quarter of an inch of rainfall in twenty-four hours in the calculations made for the sewerage of Portsmouth. This was the Metropolitan scale, exactly that adopted by the late Sir Joseph Bazalgette. It had failed in London and Portsmouth, and it would fail everywhere when adopted under similar conditions. In the northern portions of London the old sewers were above the level of high water in the Thames, but in the south of London and other low-lying parts there was no free outfall, and the heavy rains must either saturate the subsoil or flood the surface of the district and the basements of the buildings. In London special supplementary surface drainage outfalls had been constructed to remedy the defects that arose from the design of the Metropolitan Main Sewerage, and in other towns where this scale had been followed the local authorities would similarly have to adopt remedial measures. The important point was that they should deal with rainfall according to local circumstances, having reference to the fall in the district, to the relative levels of the district with the river or sea, and to the geological conditions. It must not be left to take care of itself; it must be calculated and dealt with with as much care as the water-supply. In low-lying districts it should be provided for by a duplicate system of sewers, and lifted by steam or other power above the level of high water. The Corporation of Portsmouth was very fortunate in having a large harbour and rapid tidal currents, which carry away the sewage of the town. These natural advantages had been utilised to their fullest extent in the construction of the sewage storage-tanks and outfalls, and he had every reason to believe there was no return of sewage on the foreshore and no nuisance. But the young engineer must not take Portsmouth as an example, and adopt the principle somewhere else where the local conditions might be altogether different. Sea outfalls required the greatest care as to their placement and construction, and if the currents were not favourable crude sewage should not on any account be discharged from them. In cases of this kind precipitation must be resorted to, and only the effluent be discharged into the sea. Among the questions which were agitating the public mind was that of the ventilation of sewers. Inquiries were being continually made by local authorities, patents taken out, and experiments made by experts, but they were practically to-day where they were thirty years ago. The prevailing system was that of open gratings over the manholes in the centre of the streets, but this had the disadvantage in some cases of causing a nuisance to passers-by, and to the occupants of adjacent dwellings. He contended there could not be too many inlets and outlets to a sewer, and after forty years' experience, he had come to the conclusion that an open sewer down the centre of a street with a good fall, would be the best form of construction. That, however, was impracticable; and he, therefore, said, "Get as near to it as you can." When a ventilator smelt, the local authorities generally ordered it to be closed. Greater folly could not be committed, for if the smell was not allowed in the streets, it would most likely appear in the houses. Noxious gases could not generate in a sewer with a self-cleansing velocity. A ventilating device called Keeling's Destructor, which had been tested on a large scale at Croydon, was very highly commended by Mr. Walker, the Borough Engineer of Croydon. With respect to the disposal of sewage in towns, continued the paper, the system of precipitation was growing more into favour for the following reasons:—Firstly, the improved means of disposing of the sludge; secondly, the failure of so-called sewage-farms; and, thirdly, the growing tendency to combine precipitation with land filtration. On the question of healthy dwellings, the lecturer said: "We are now face to face with a cholera epidemic, and it is necessary that the most improved regulations for the preservation of the public health should be everywhere enforced with the utmost strictness. The towns of Hamburg and Havre are illustrations of this want of those essentials of public health. A physician of Hamburg says: 'Unfortunate'y, Hamburg is built contrary to all rules of sanitation. The houses have no yards, and close behind are other houses, old, many-cornered, dark, and airless, the overcrowded habitations of the poor being filled with dirt and ill-smelling. In addition, the Elbe is partly dried up and on its banks is deposited all kinds of refuse.' On the other side of the Channel we have the large and important seaport of Havre, the normal death-rate of which is more than double that of Portsmouth. In 1884 I prepared a report on the sewerage of this town, the authorities appointed a committee of experts to sit upon it, but nothing has been done from that day to this. These two towns, Hamburg and Havre, are in communication with this country, and they are sending forth a pestilential army to invade our shores. We may by constant vigilance keep them out, but it is a scandal in these days of International Congresses that such sanitary neglect in Germany and France is allowed to exist." He was certain these Congresses had a tendency to raise the standard of knowledge and of sanitary work amongst his professional brethren. The past history of sanitary science had chiefly concerned the medical officer and Sanitary Inspector, the future would chiefly concern the architect and the engineer. In proportion as the architect and the engineer did their work well, so would the duties of medical officers and Sanitary Inspectors decrease. The speaker stated that an exceedingly small number of houses, even of those let at high rents, were in a proper sanitary condition. Owners of houses and their agents, whose interest it was to let, could not be expected to answer impartially the question put by an applicant,—Is this house in a perfect sanitary condition? They might be honest in answering the question affirmatively, and yet the tenant might find his family begin to sicken on entering into occupation, and might discover, perhaps, when too late that none of the conditions proper to a sanitary house existed in his dwelling. No doubt the poor were more hardy, and, having to rough it, became to a certain extent disease-proof. Dangers which they escaped would be fatal to children more delicately nurtured, and to the more carefully housed well-to-do classes. No man should take a house unless he had satisfied himself that it was in a proper sanitary condition. In the interest of his family and himself, the speaker would advise every would-be tenant to pay the small cost of an examination by a competent man. He would then feel that he had done his duty as a father and a citizen. The sanitary architect called in (he had coined a new term) should insist on the following points:—(1) a dry subsoil; (2) a damp-proof course either of asphalt or two thicknesses of slate; (3) walls which would keep out heavy rains, or, preferably, hollow walls; (4) a good pitch of roof; (5) good ventilation under the floors, separate from the smoke flues and with proper inlets; (6) drainage in stoneware pipes outside the house, disconnected from the main sewer, and ventilated; cast-iron pipes under the house with lead joints; (7) water-closets with wash-out or flush basins; soil pipes outside the house carried up full size, and ventilated; and (8) sinks of all kinds disconnected from the sewers and discharging over open gratings. With respect to the question of overcrowding, he said occupiers of insanitary dwellings were merely removing to other houses, but the overcrowding still continued. Much had been done during the last year under the Housing of the Working Classes Act, 1890, but a danger still remained which local authorities must face. What was wanted was the erection of suitable dwellings to take the place of those condemned. There was an opening for an architect to design a good healthy dwelling for the poorer working class at a reasonable cost, so that local authorities might be induced to erect them. A good, model working man's home was wanted in our crowded towns, where there was a large dining-room and reading-room common to all, and a separate bed-room for each lodger. Such a place for single men would be much sought after, and would always command good tenants.

Sir Charles Cameron, in proposing a vote of thanks to the President, said that papers of that kind, which dealt with practical matters in a concrete form, were of much greater interest to an audience, composed as that was of practical men, than any abstract or merely theoretical discourse would have been, but there were also in it many points of great general interest, particularly to the inhabitants of towns on the coast, for which any scheme that could be prepared would greatly differ from one that would be suitable for towns far from the sea. What might be permissible at Portsmouth, where they had a strong tidal current, could not be permitted in a main drainage scheme for Dublin, for example, where the difficulty was how to dispose of the organic matter, and where they might only discharge what appeared to be a pure effluent. Dublin had not such a good current as Portsmouth, although it was upon the sea. Any solid matters discharged there would come back every twenty-four hours. With respect to the ventilation of sewers, he thought it would be better for the drainage of each house to pass by an open conduit, for then it would only be the persons in each house that would be affected by any smell, and not the whole community by accumulated smells, as in the case of defective ventilation. He had been experimenting for some years, and he had discovered that the air was always going into the sewer, and not out. This was notably the case between 7 o'clock and 8 o'clock in the morning, when fires were being lighted all over the city. It proved that air was being drawn up out of the sewer

* See last week's *Builder*, page 222.

wherever the traps were defective. His impression was that there was not much pressure in the sewer as a rule, and, with house drains properly trapped, the air in the sewer would not be able to force the traps. There might be much more pressure at times from temporary causes, but for periods of eight or ten hours a day he had known the pressure only to be half an ounce or an ounce to the inch. At present, at Dublin they discharged all into the Liffey where it was tidal, but that would all be done away with under the new drainage scheme, because it would be continuous in its working.

Sir Thomas Crawford, in seconding the resolution, said he was reminded, in seeing so many medical men among the engineers and Sanitary Inspectors, of a fact which it might be advantageous to mention. He had been a medical officer forty,—nearly fifty,—years, and he had never felt the difficulty, that appeared to be a trouble sometimes, of drawing a distinction between the functions of the medical officer and those of the sanitary engineer. There was a very definite distinction between the two. The medical officer should search out the cause of an evil, and leave the remedy for it to be found by the engineer.

The resolution was carried by acclamation, and Mr. Lemon briefly replied.

Softening of Water.

Mr. H. Law, M.Inst.C.E., &c., was then called upon to read a paper on "Apparatus for Softening Water." The *rationale* of the process, he said, consisted in adding to the water certain substances which reacted upon the foreign substances already contained in the water, forming new compounds, that being no longer soluble, might be removed either by filtration or precipitation. The largest installation he knew of was at Southampton.

The discussion was opened by Sir Charles Cameron, who wanted to know the cost of treating, say, 1,000,000 gallons by the process, and whether it was applicable to refiltering on the large scale. Water, he held, should be used as quickly as possible when conveyed in pipes, and if water that had been filtered remained many days in a reservoir, it should be refiltered.

Mr. Rogers Field, C.E, thought the paper a very valuable one. It proceeded on a very distinct plan, and, tried on a large scale for a public supply, it would be found of the greatest possible advantage where people knew what they were about. He thought pressure should be put upon the water companies to act for the public good, and not exclusively for profit. He had long turned his attention to the question of softening water, and had investigated personally, or through assistants, perhaps every important installation of the kind in the country. The difficulty with the process was not where it was worked on a large scale, but where water had to be softened for a house, or a small number of houses. There were such installations, and when first set up they all looked very nice, but in a little time they choked up. A chance visit would generally disclose the fact that the pipes were stopped up or that they were not getting the right proportion between lime-water and pure water. For domestic purposes a successful apparatus had yet to be invented. On the other hand, any city that would adopt the process for public purposes would reap a great advantage. Merely in the money point of view they would realise a great economy.

Mr. W. Whitaker, F.R.S., &c. (engineer, Southampton Waterworks), said that at Southampton they reduced the hardness of the water from 18 degrees to 8 degrees, using as little lime-water as possible. In the North of England it had been found they were getting their water too soft. Water that was too soft was not wanted. The trouble was to get rid of the deposit. There was an opportunity for inventors to find a profitable use for a new waste product. He hastened to say at once they could not make whiting of the lime residuum. The cost at Southampton was a farthing per 1,000 gallons, say, for a million, the professional guinea; at Bedford, a smaller town, it cost nearly a halfpenny per 1,000 gallons. With regard to water companies who poohpoohed the proposal to adopt the process, he knew some of these who softened all the water they used in their own boilers. Mr. Whitaker, in conclusion, invited the members of the section to visit Southampton to see the process at work.

Dr. Axford and Mr. F. R. Chappell having spoken, the Chairman, in closing the discussion, said that at Southampton they saved the softened water for the higher purposes, and used the other for the drains and the streets.

Mr. Law, in reply to a vote of thanks, said that at Southampton they had no tanks. Mr. Whitaker had correctly given the cost, but with tanks it would be reduced to the mere cost of the lime. Of course the process was applicable to Dublin, but for dietetic purposes it was often a mistake to soften the water. He endorsed the opinions of Mr. Rogers Field, who had great experience. The great difficulty, as he stated, was the small apparatus for domestic supplies. The residuum was valuable as a top dressing for land.

Water-Supply and Purification.

In other sections of the Congress, "Water" was the subject of several papers and discussions. Dr. Horace Swete read a paper detailing a process of purification of the waters of the Severn at Worcester by metallic iron; Mr. W. Whitaker (water engineer, Southampton) read papers on the "Water-Supply in the Central and Eastern Parts of the London Basin," with maps and diagrams on "Local Geology from the Sanitary Standpoint," and Mr. W. C. Young presented one on "The Determination of Dissolved Organic Matter in Water."

The Worcester experiment, as described by Dr. Swete, appears to be succeeding perfectly so far as it has gone. Three purifiers capable of dealing with 1,700,000 gallons of water per day have been put down on certain conditions, a company undertaking during a period of six months working to adequately purify the very impure water of the Severn, which, before reaching Worcester, has received the sewage and refuse of Llanidloes, Newtown, Welshpool, Montgomery, Oswestry, Shrewsbury, Trowbridge, Bridgnorth, Cradley, Stourbridge, Kidderminster, Stourport, Bromsgrove, and Droitwich. It is an application of the principle of the spongy-iron filter, with a modification suggested to Dr. Anderson by Sir F. Abel after the spongy-iron process had failed for the waterworks of the city of Antwerp in 1884. The suggestion was that if the spongy-iron could be kept in motion in the water to be filtered it might be more successful, and on this idea Dr. Anderson designed his Revolving Purifier, the apparatus now on trial by the city of Worcester. The undertaking is (*a*) to remove from the water all colour; (*b*) to reduce the organic matter by 50 per cent. at least; and (*c*) to reduce the microbes to Dr. Koch's limit for pure water of 100 microbe colonies per cubic centimètre. Dr. Swete thus concludes his paper:—

> I think that when a supply of deep well water cannot be obtained the result of the experiment at Worcester shows that there is a process that may render a river or brook water sufficiently good to come within the category of potable waters, and must, therefore, be a subject of interest and importance to medical officers of health.

Mr. Whitaker's maps were prepared and sent to the International Congress of Hygiene and Demography last year, together with a paper, but the paper arriving late was not read.

The principal portion of the discussion in section III. was devoted to the two papers by Mr. Whitaker, who followed the President of the section (Dr. Russell), after he had been accorded a vote of thanks for the presidential address, which was upon "The Chemical History of the Air."

Dr. Russell, in opening the discussion, touched upon the importance of pure water to all communities, and of the fact that had been made clear by Mr. Whitaker's maps and his papers that the water held in the chalk—that big sponge—was the purest and best source of supply for domestic purposes.

Mr. Rogers Field, C.E., said that in the many investigations he had been called upon to make into sources of water supply he had obtained little or no guidance from the ordinary geological maps, because it frequently happened that where chalk was shown they found stiff clay. He should be glad when the new maps had been extended to all parts of the country. Anybody who studied the subject would see that it was of vital importance, for if they calculated upon getting water from so many hundreds of square miles, and only got it from one half, it entirely altered the problem.

Mr. Henry Law, C.E., asked how far the existence of chalk affected the water-supply? Mr. Whitaker had told them the circumstances which affected the entry of water into the chalk, but there was another important question concerning its escape from the chalk. In many parts of the valley of the Thames enormous volumes of chalk water might be seen running to waste. In an investigation he carried on for two years in connexion with one of the metropolitan water companies, the object being to obtain a supply from the chalk, he found it escaping at the mean level of the tide from Hammersmith to Brentford, and at Erith they might see the same thing.

Dr. Groves (Isle of Wight) mentioned an instance that had occurred in that district of an owner sinking 200 ft. into the tertiary clays to find water for two cottages. He thought all sanitary authorities ought to possess copies of the valuable maps of Mr. Whitaker and his colleagues. The water taken for towns from a distance often prejudiced the local supply. He knew a case in which some cottages had been without water for five or six years through action of this kind on the part of the municipal authorities at Ryde, Isle of Wight. The law ought to be strengthened in this respect, for at present the landlord could only be compelled to supply water when the cost did not exceed 10*l*., or, in exceptional cases, with the sanction of the Local Government Board, 13*l*.

Dr. Newsholme (Brighton) asked if Mr. Whitaker had seen an article in the *British Medical Journal* stating that, in consequence of water taken from the ground north-east of London, the whole landscape was altering and tree-growth diminishing, and saying that the limit of the water-supply was nearly reached, so that London would have to go to a greater distance for its water. Would there be a sufficient supply in the South Downs without detriment to the local supply there?

Mr. Washington Lyon asked whether London might not obtain a sufficient supply from the chalk beds beneath it?

Mr. Whitaker, in reply to the speakers and to a vote of thanks, said the question of the escape of water was a difficult one to deal with. Speaking of the abundance of water in the chalk, he mentioned the case of Brighton, where, in making a sewer, they accidentally tapped a spring, and were nearly flooded with fresh water. In some places near the sea they could sink wells and get good water; in others a mile away from the sea the wells would only yield salt water. This was noticed in some parts of Essex. And in another instance, a well sunk in the chalk having given only salt water, the bottom level was raised, and they were now getting good water from the upper part of the chalk. When a company took away the water-supply from a district it ought to give a fresh supply at a reasonable rate. As regarded the alleged change in the condition of the country from which water was taken he thought they would want a double million magnifying glass to see it, so infinitesimal was it. There was certainly a large supply in the South Downs, and a large amount ran to waste, which might be taken without disadvantage to anyone. With regard to the water beneath London, he thought they would fail to get a sufficient supply by sinking wells. They might sink 200 wells and only find one of them successful.

Another discussion took place in the afternoon upon a paper by Mr. Whitaker, showing how the water supplies for Portsmouth, which were from the chalk, and for Gosport, which was from strata of clay and sand, were obtained.

The paper described the Gosport Waterworks as an excellent example of the way in which every distinct bed of sand was made to contribute to the water-supply all the way down. He had been struck by the ingenious manner in which, by means of a large well or reservoir, they were able to store a day's supply before they commenced pumping. Portsmouth got its water with the minimum of trouble; indeed, he had never seen a more simple or easy piece of work. The chalk from which it came was at the junction of the tertiary beds, and he was not sure there was not some mixture in the water,—not that this was any disadvantage, for it made it somewhat softer than it otherwise might be. The Waterworks were near Havant, which stood on a gravel flat full of water. The water obtained from gravel strata, through which sewerage percolated, might be deleterious to health, and he urged the Portsmouth people to spare no precautions to prevent contamination from Havant.

Mr. J. H. Ball (Southsea), who opened the discussion, asked for information as to the various springs to be found in the neighbourhood of Havant. He bore testimony to the great care the Portsmouth Waterworks officials took to prevent any contamination of the water-supply.

Dr. Groves pointed out the difficulty always met with in getting ancient wells closed where

there was not evidence of impurity in the taste or smell. He remembered a case in which the greatest difficulty had been encountered in getting an Order of the Council carried out to close certain wells in the Strand district in London during the last cholera epidemic. One of them, called the "holy well," led to a great fight. In another case great opposition was offered to one being closed in Holywell-street, until, on examining it after the lead pipe had been removed, he found a drain running into it leading from a closet used by cholera patients. The contents of the closet would have found their way into the "holy well" if they had not stopped it up.

Mr. Smith (Engineer to the Portsmouth Waterworks Company), Dr. Axford, Dr. Keatey, the Chairman, and other gentlemen took part in the discussion.

Mr. Whitaker, in reply to Mr. Ball, said the springs referred to near Havant were but the repetition in another place of the springs from which the Water Company got its supply, but they were at a higher level in the valleys of the chalk hills. They were known under a host of names, and he asked Mr. Ball, or anyone else, to record the times of the outbreak of the springs, and as to the water-level of the wells in their vicinity. Mr. Baldwin Latham had taken such careful observations of the outbreaks that he was able to predict on what day, and where, these streams would break out. He urged that no water ought to be got in big towns except from the companies. There were many wells in the area of the Strand mentioned by Dr. Groves. He remembered one in which, when an examination was made, a coffin was found near the bottom.

Smoke Prevention.

At the second sitting of the Engineering Section, a paper was read by Mr. H. S. Terry, F.I.C., on the smoke clauses of the Public Health Act, 1875, the leading ideas in which were:—(*a*) that grey smoke from domestic and other hearths is more injurious to the public health than black smoke; (*b*) that the appointment of experts as "Smoke Inspectors" is necessary; (*c*) that the problem of "smoke prevention" in England remains yet to be solved; and (*d*) that care should be taken not to harass manufacturers.

In the discussion which followed,

Dr. Black said the blue smoke from cottages might be deleterious, but the black smoke from factories was like an eruption of Vesuvius. Once while staying at the Queen's Hotel, Manchester, he saw smoke in huge volumes issuing out of the chimneys of the Royal Infirmary. Had that occurred at a factory, the owner would have been punished. The other day in Edinburgh he saw the same nuisance arising at a new club-house. He reported the case and was told by the authorities that they had not the least idea of the existence of the evil. With an efficient system of inspection such evils would cease to exist.

Dr. Oldfield agreed that they should be cautious how they harassed manufacturers. It was a question of degree. It ought to be settled to what extent such nuisances could be permitted without being intolerable, and then from that point they might insist on absolute obedience to the regulations. He mentioned a dangerous smoke nuisance from brick-burning at Ealing. There was no black smoke, but a faint and deadly feeling came over persons who breathed the fumes.

Dr. Groves (Isle of Wight) said he hoped to have got some light with regard to the smoke nuisance at cement works. He knew a very great lady who had often had cause to complain of a nuisance of that kind. It would cause people a mile off to cough and sneeze. Chlorine would produce the effect, but there could not be enough of it in smoke to account for it. He believed cement works had been brought under control at Southampton, but he was not able to say how it had been done.

Mr. Lemon (Mayor of Southampton) said he was one of a committee appointed to visit the different cement works all over England, in order if possible to discover the means of remedying the nuisance of smoke from cement works. They had since compelled the cement manufacturers at Southampton to introduce a cremator between the furnace and the chimney-shaft, and it appeared to have been effectual, no complaints having been brought in Southampton of late years against the cement factories.

Mr. Terry, in acknowledging the vote of thanks, replied to the various observations, and again insisted on the necessity of the appointment of men of acknowledged attainments in science as inspectors.

Ventilation of Drains, and the Pollution of Rivers, &c.

Mr. H. R. Kenwood, M.B., D.P.H., F.C.S., read a paper in the Engineering Section on "Drain and Soil-pipe Ventilation." The present system of soil-pipe ventilation was obviously faulty, said the lecturer, air frequently entering where it should escape and escaping by the outlet by which it ought to have entered. To secure greater certainty he had attempted to apply a simple remedy,—so simple that he was astonished when he found himself the first to suggest it. In most houses, except the poorest, there was a circulation of hot as well as cold water, and, of course, it was laid on to the bathroom which was generally on an upper floor. His suggestion was to extend the hot-water circulation so as to enclose in a kind of jacket the ventilating-pipe which communicated with the drain for the purpose of securing a constant upward draught and an escape at a point above the roof, of the foul air from the sewer.

In the discussion which followed Dr. Groves, Mr. J. H. Ball, Dr. Axford, Mr. Nanson, Mr. Chaloner, Mr. Symons, Mr. Fletcher, and the President took part. Dr. Kenwood's proposal met with little sympathy in the meeting, one speaker declaring that a southern or south-western aspect would be as effectual as Dr. Kenwood's hot-water jacket, which he thought might be good as an ideal but not as a practical measure.

The usual vote of thanks having been accorded to Dr. Kenwood, the last paper of the day was read by the Vice-President, Major Laverock Flower, on behalf of the writer, Mr. Hepworth Collins, F.C.S., &c., Analytical Chemist, Bolton. The subject was, "The Pollution of Rivers and Canals by Manufacturing and Industrial Operations." The writer said there did not appear to be any valid reason why every manufacturer should not be compelled to deal with the polluted water upon his own premises. Possibly the most effective and economical way of dealing with the enormous volume of pollution from manufacturing sources was by concentration and evaporation, followed by condensation.

The section resolved that it was desirable that local authorities should have enlarged powers to compel manufacturers to cleanse the rivers into which their waste products ran, and if they did not do so, to carry out the work and charge the manufacturers with the cost. This completed the business of the day, except a paper by Dr. Maguire on "The Prevention of Typhoid," which was postponed to the following sitting.

Disposal and Treatment of Sewage.

At the last sitting of the Engineering Section, which was held on Friday morning, with Mr. H. Percy Boulnois (Vice-President) in the chair, three papers were read, each dealing differently with the disposal and treatment of town sewage. The three papers were read in succession before the discussion was taken.

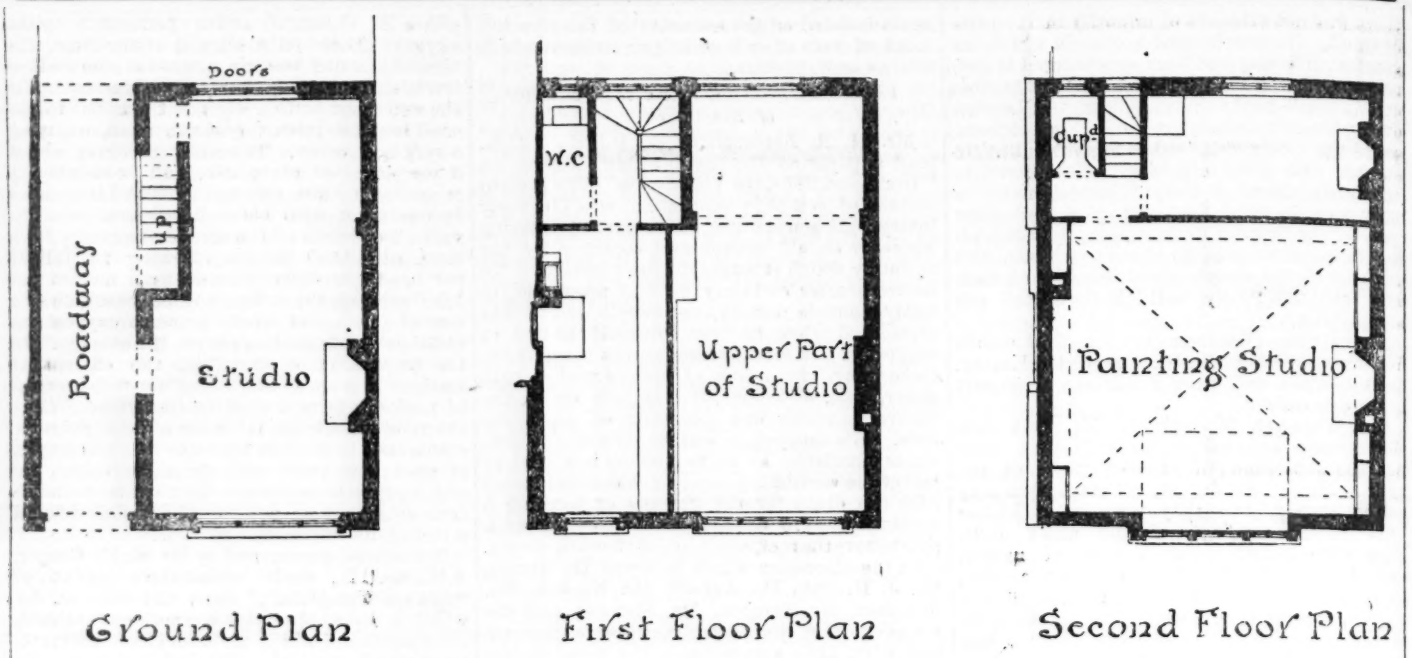
Mr. E. Scruby (Epping) described a new method of filtration and precipitation, which he illustrated by a diagram. Stimulated by a declaration made in March, 1891, to the London County Council by Sir Benjamin Baker, Mr. Scruby has made many experiments during the last fifteen months with various samples of very offensive sewage, and this paper gave the results. The following was the official engineer's declaration to the London County Council: "It seems to me well nigh impossible to formulate a plan for dealing with and disposing of London sewage in a manner which shall be beyond question." A quantity of sewage having been procured by Mr. Scruby from the drainage outfall and made more repulsive by being kept for a week, a portion was passed through a chamber containing free oxygen and was then found to have become odourless. The inventor next bottled off a portion of the sewage that had undergone a first treatment, a portion of untreated sewage and some rain-water, and put the three bottles away side by side for daily observation. After a few days, while the untreated portion had got worse and the rain-water remained unchanged, the treated portion of sewage effluent appeared to have become clearer. At the end of six months, when all chemical changes appeared to have long ceased in the treated fluid, the bottle was turned half down in an oblique position when a thin film fell from the sides of the bottle and left the contents perfectly clear. This seemed to indicate a third phase of chemical action performed by the oxygen. Later on, during a sharp frost, the treated portion became a mass of the whitest snow, still remaining perfectly odourless, while the untreated portion did not freeze but thickened into a repulsive, greenish mass, emitting a very bad odour. The solid portions, about 3 per cent. of the whole, had been already separated by filtration and rendered innocuous by treatment with burnt lime-stone. The inventor's estimate of the cost of treatment for a town of 40,000 people, allowing 20 gallons per head per diem, was 40*l.* per annum per 1,000 persons, the estimate being based on the cost of fuel, which would produce oxygen gas at 5s. per 1,000 cubic feet on the average. In the process of oxygenation, the effluent is resolved into spray in passing through a series of perforated trays within a container. When the resultant liquid is drawn off, the inventor states that he derives from the foulest samples of sewage at small cost, perfectly limpid, inodorous, and translucent water; and he demands from scientists an analysis of his effluent and a test of his estimates.

The second paper, read by Mr. C. H. Cooper, A.M.Inst.C.E., dealt with three modes of "Sewage Treatment;" first, the natural, by which is meant the irrigation methods; second, the mechanical which includes electrical treatment; and, third, the chemical methods. By means of a diagram, the writer of the paper showed the proportions in which micro-organisms exist at different depths on land treated with sewage, to prove his theory that the work of nitrification, which produces such beneficial results in rich moulds, and reduces the most offensive organic matter to innocuous inorganic substances, always takes place near the surface. He has found by many experiments that 61 per cent. of the microbes are found within 1 in., and rather more than 36 per cent. at a depth of between 1 and 2 in., of the surface, leaving less than 3 per cent. below these top-layers, though traces are found even so far down as 60 in. This fact leads him to ask what soil affords the best home for these beneficent organisms to work in, and whether the better results are given by soil protected by a crop or by fallow land? Mr. Cooper states that the death-rate on the sewage farms competing for the City of London's prize is only four per 1,000, and on the Berlin sewage farms, recently described before the Institution of Civil Engineers by Herr Roechling, only 9·75 per 1,000.

The concluding paper, read by Dr. A. Angell (public analyst, Southampton), was largely devoted to combatting the irrigation theory. The rest of the paper was devoted to proving the superiority of the method of purification of sewage by passing it through "polarite," and to showing how the noxious residuum called sewage-sludge, and the equally noxious refuse from gasworks, known as "blue billy" (waste lime from gas-retorts) can be made into a valuable, inodorous, and in all respects unobjectionable, hydraulic cement, superior to that used on the Thames Embankment and in many other public works. Two filthy by-products are thus converted into a material used in large quantities and purchased at high prices by corporations and other public bodies. Of this cement several samples were shown which had been produced under Dr. Angell's supervision, and for which a tensile strength was claimed of 293 lbs. to the square in., or 659 lbs. to the 1½-in. briquette.

In opening the discussion, Mr. H. P. Boulnois, the Chairman, pointed out the enormous importance that would attach to the invention, if Dr. Angell's provisions were fulfilled, with regard to making cement out of sewage sludge and "blue billy." Engineers were apt to look at all questions from the £. s. d. point of view, and it appeared certain that if what they had just heard was all true, somebody ought to make a good deal of money out of the invention. If he succeeded in converting two repulsive waste products into a useful cement, he would have succeeded in solving one of the most baffling problems that had ever come before the engineer. Mr. Scruby had described a new process, but unfortunately it had never been treated on a practical scale, and they could never tell what the real results would be until it was so tried. Chemical processes required a great deal of watching. Mr. Scruby had not told them how he proposed to deal with the sludge of London sewage, the treatment of which cost at present 175,000*l.* a year. Mr. Cooper had laid before them a valuable table, with some very graphic diagrams. These enabled them to see at a glance the process going on.

[*Continued on p.* 245.



Studio, Melbury-road.

Illustrations.

SELBY ABBEY, EAST WINDOW.

WE give a reproduction of the large drawing of this window showing the restoration of the glass by Messrs. Ward & Hughes, which was exhibited in the Royal Academy this year. The following notes supplied by Messrs. Ward & Hughes are, they inform us, mainly an abridgment of the history of the window written by the late Dr. James Fowler of Wakefield, Secretary of the Society of Antiquaries of Yorkshire:—

"The Selby (Abbey), Carlisle (Cathedral), and Shrewsbury (St. Mary's Church) windows appear to have been originally closely similar in design and treatment. In each case the glass is of a somewhat later date than the stonework which holds it, but the Selby window is the most valuable and important of the three, as containing the whole of the tracery almost intact, and a good deal of the glass of the main lights of the window, some eighteen figures out of an original scheme of seventy, with a large number of fragments of a Tree of Jesse. The Shrewsbury window contains the original figure of Jesse, which at Selby had gone entirely, and this figure has been reproduced recently in the restoration as being the best authority for such a work. This window also has the advantage of the series of Kings and Prophets almost complete, but almost the whole after tracery is modern and not to be compared for a moment with that of either Selby or Carlisle.

The five central lights, out of seven, were occupied by a Jesse Tree with, in the outer light to the (heraldic) right, prophets foretelling the coming of Our Lord, and in that to the left apostles, evangelists, and doctors proclaiming Him as come, and announcing further His second coming to judge the world in majesty. Fragments have indicated that the balance and symmetry of the composition was attained by the introduction of the twelve minor prophets and the four major, balanced by the twelve apostles and the four Latin fathers.

The central light had a red background and border of yellow crowns on a blue background. The light on each side of it had a blue background and border of yellow lions on a red ground; the light on each side of these had a red background and border of brown squirrels cracking nuts, on sprays of yellow hazel on a blue and red background; and, lastly, the two outermost lights had each a blue background and border of yellow triple-towered castles and white covered cups alternately, on a red ground.

The heads of all the seven lights, more or less dilapidated but in the main well preserved, were found, and they were invaluable as giving the key to the order of the lights, confirming the account given by Johnston in his MSS., and showing the manner in which the Jesse Tree was carried from the main body of the window into the tracery. Owing to the deep recessing of the stonework this portion of the window, like the tracery glass, is scarcely corroded, the colour and painting being almost as fresh and distinct as the day the window was completed. Every particle of background, in whatever situation, was diapered with the most extreme richness, and presents a monument of labour which excites one's wonder and respect in the highest degree.

In the central lights were figures of Masaias (Amaziah), Ezechias (Hezekiah), Josias (Josiah), Joachim (Jehoiakim), Joseph (the husband of the Virgin), Jeconias (Jechonias), and Herodes Ascalonita (Herod the Great). These figures, in rich robes,—the Kings with crowns, and some with sceptres,—all stood among the leafy branches of a spreading tree, which sprang out of the body of Jesse. The last light contained figures of Matheus, Johannes, Petrus, Paulus, S. Gregorius. Mr. Morrell says S. Jerome also.

Immediately over the representation of the Virgin and Child in the central light, the Crucifixion occupies the first compartment of the tracery, with above it the Holy Dove. This compartment concludes the Jesse.

The Doom in the tracery represents our Lord seated in judgment in the uppermost piece, on His right and left hand are cherubim, the darkened sun, and the waning moon. Underneath the figure of Christ are angels holding emblems of the Passion, angels blowing the trumpets of the Resurrection, and the archangel Michael weighing souls; on the right hand the gate of heaven, on the left the gate of hell; and distributed among the remaining tracery all classes of men rising from their graves, kings, priests, rich, and poor, with angels carrying the redeemed to bliss, and demons the condemned to punishment. Two compartments contained coats of arms; one had entirely gone, the remaining one showed the arms of England (gules, three lions passant gardant), and can scarcely be of later date than A.D. 1340.

The history of the restoration is briefly this. At the commencement of this century the remaining fragments in the window were removed from the stonework, and without much care put into cases and placed in the triforium of the Abbey. When through the enterprise of Mr. William Liversidge, of Selby, who has done so much for the Abbey, some four years ago these cases were brought to light with a view to the reconstruction of the work, the prospect when the boxes were opened was not encouraging, for a chaotic heap of glass and lead was all that presented itself. With care and patience on the part of Mr. Curtis (of the firm of Ward & Hughes) order was evolved, and when the fragments were laid out on the floor of the Abbey, after much and lengthy labour, the original design of the window was beyond question.

The original figures are indicated by the words "old glass" on the accompanying illustration. As regards the freely-designed vine running all over the five central lights, its execution on the glass is exquisite in its refinement and delicacy."

SOUTH LYTCHETT MANOR.

No traces remain of the previous Manor House said to have existed at South Lytchett. The present fabric—the country seat of Mr. Elliott Lees, ex-M.P. for Oldham—dates from the early part of the present century, and possesses no architectural interest. The general planning of the rooms was good, though the central space, upon which they gave, was encumbered by a curious network of dark passages, cupboards, and large waste spaces without access, which apparently existed in a strife after an Italian treatment of plaster vaulted corridors.

It was found that by merely lifting out the partitions in the centre, without disturbing the old walls, a finely-proportioned hall could be obtained, with surrounding recessed galleries, upon which the principal bedrooms open.

There is a music-gallery at a lower level across the end, not shown on the drawing.

With the exception of a large window on the new staircase, the hall is generally top-lighted. A system of double glazing is adopted, with an intervening space for cleaning, to which access is obtained from either side of a passage across the ceiling, which conveniently connects the second-floor rooms on both sides of the house.

The work was executed by Mr. Dart, of Crediton, to the plans of the architect, Mr. W. D. Caröe, M.A., F.R.I.B.A. The owls (the owl being the family crest) were modelled by Mr. Hitch, of Kennington.

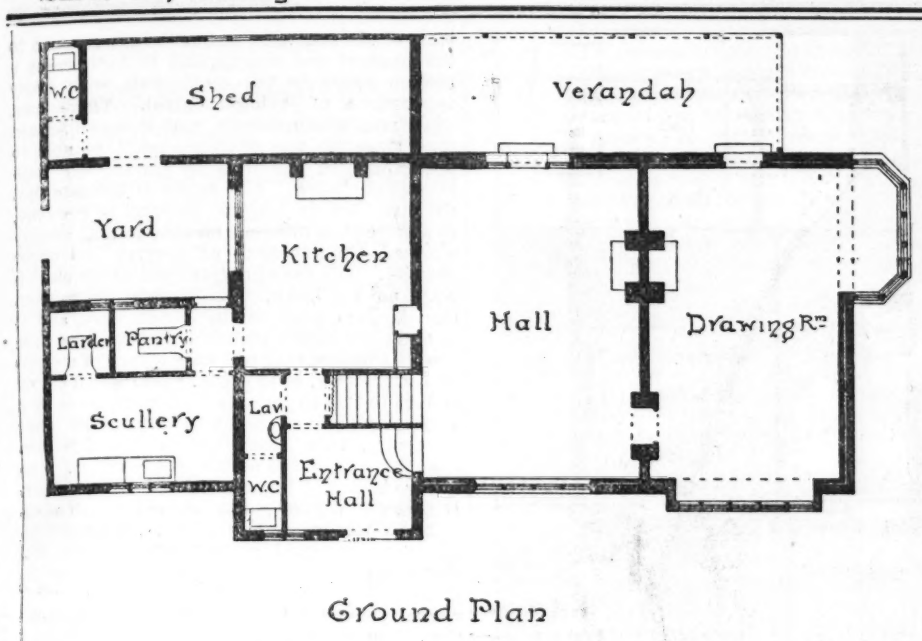
STUDIO, MELBURY-ROAD.

THE illustration is of a new studio in Melbury-road, Kensington, which has been erected for Mr. Hamo Thornycroft, R.A.

The building was carried out in red brick with Portland stone dressings by Messrs. Adamson & Son, of Chiswick. Mr. J. Belcher is the architect. The drawing was exhibited in the Royal Academy of this year, as well as that of "Mark Ash," mentioned below.

"MARK ASH," ABINGER.

THIS house has been recently erected at Abinger, Surrey, for Mr. E. H. Ledward, from the designs of Mr. J. Belcher. The ground story is of local stone with joints studded with pebbles, the upper portion being of half-timber and rough-cast, and was carried out by local builders, Messrs. W. & G. King, of Abinger Hammer.



"*Mark Ash*," *Abinger*. [*See page* 244.

THE SANITARY CONGRESS.

(Continued from p. 243.)

Col. Jones, V.C. (late R.E.) said the papers had struck out each a new line of its own. He was in favour of employing the laws of nature in every possible way, and therefore he welcomed and admired the ability displayed by Dr. Angell as a chemist. He had long ago experimented with "Polarite" and had been for a long time associated with General Scott, who had spent a great deal of time and money in trying to get rid of and convert to useful purposes the noxious stuff with which Dr. Angell had been experimenting. He could not fail, therefore, to be deeply interested. He was also deeply interested in Mr. Cooper's paper and diagrams. At last, in the Massachusetts experiments there was found an attempt to discriminate between the results of simple natural subsidence and those produced by chemical reagents. He would like to know from the London County Council what difference there would be in the results obtained by natural subsidence without chemicals and those obtained by the employment of 3·7 of lime and 1·0 of iron from which their chemist now claimed to have obtained important advantages over those obtained formerly with metropolitan sewage. He would suggest that the Sanitary Institute should memorialise the Council to give the results referred to.

Mr. Alderman Bolton (Burslem) and Mr. Rogers Field declared themselves partisans of the direct farm treatment of sewage.

Major Laverock Flower (Lee Conservancy Board) called upon Mr. Scruby to treat by his process 1,000,000 gallons of sewage during the next six months and then come again to the Institute with his results. He strongly commended the efforts both of Mr. Cooper and Dr. Angell.

A vote of thanks was accorded to the three gentlemen who had presented these ingenious papers, and they were severally called upon to reply. Mr. Scruby simply claimed that his work should be put to a scientific test; and Mr. Cooper attacked Dr. Angell for the wonderful properties he claimed for polarite, which appeared, he said, to be like a policeman, able to stop the bad microbes and let the good ones pass on.

Dr. Angell, in his reply, said that Mr. Cooper had objected to his claiming for polarite that it had a power of bacteriological selection, or, as he ironically termed it, of performing the functions of a policeman, only arresting the bad germs and letting the good ones pass. The power of selection he (Dr. Angell) claimed for polarite was common to all porous bodies, but as polarite was the most porous of all known substances which are stable as well as soluble, the selective power in it was the greatest. Pasteur had shown that certain organisms were killed by oxygen in their passage through the air contained in fine pores, and as the oxygen contained in polarite was in the most active state or partially condensed, it was correspondingly more fatal. But certain germs which M. Pasteur called aërobians, being fond of oxygen, passed through the pores unhurt, to do their duty of nitrification in the effluent water. In that respect the polarite was truly a policeman. With regard to the cement, he thought it could be made to a profit, even on so small a scale as five tons per day. He only required to use with the sludge 2½ per cent. of animal matter.

This concluded the business of the section except the formal votes of thanks to the President, Mr. H. P. Boulnois, and the Vice-President, Major Laverock Flower, which were passed with cordial acclamation.

Purity of Air in Stables.

The last paper in Section III. was a very brief one by Veterinary-Surgeon Captain F. Smith (Army Veterinary School, Aldershot) on a "New Method of Determining the Purity of Air in Stables." Captain Smith's method is founded upon observations of the differences between the temperature of the air within the stable and that outside. As a rule, the greater the impurity, the greater the difference of temperature. A difference of from 3 degs. to 5 degs. Fahr. always accompanied air pollution. In the best ventilated stables the interior temperature was from only ½ deg. to 1 deg. higher than the exterior temperature. Remembering that a stable receives most of its warmth from the bodies of the animals living in it, the *rationale* of the method is easy to understand. The observations were made in the winter, and at night, when the stables were usually full.

There being no discussion, Dr. Russell proceeded to close the sitting by proposing votes of thanks to the readers of the various papers in Section III. A cordial vote of thanks was also given to Dr. Russell for presiding.

Concluding Proceedings.

In consequence of the absence of so many Congressists at Netley Hospital, Haslar Hospital, Southampton Waterworks, and other excursions projected, the general meeting with which a congress is usually brought to a close did not take place; but later in the evening a public meeting was held in the large room of the Town-hall, to which the working classes were specially invited.

Professor Corfield delivered a very interesting address. The Mayor of Portsmouth presided, and many of the chief officers of the Congress attended with a large audience of the general public.

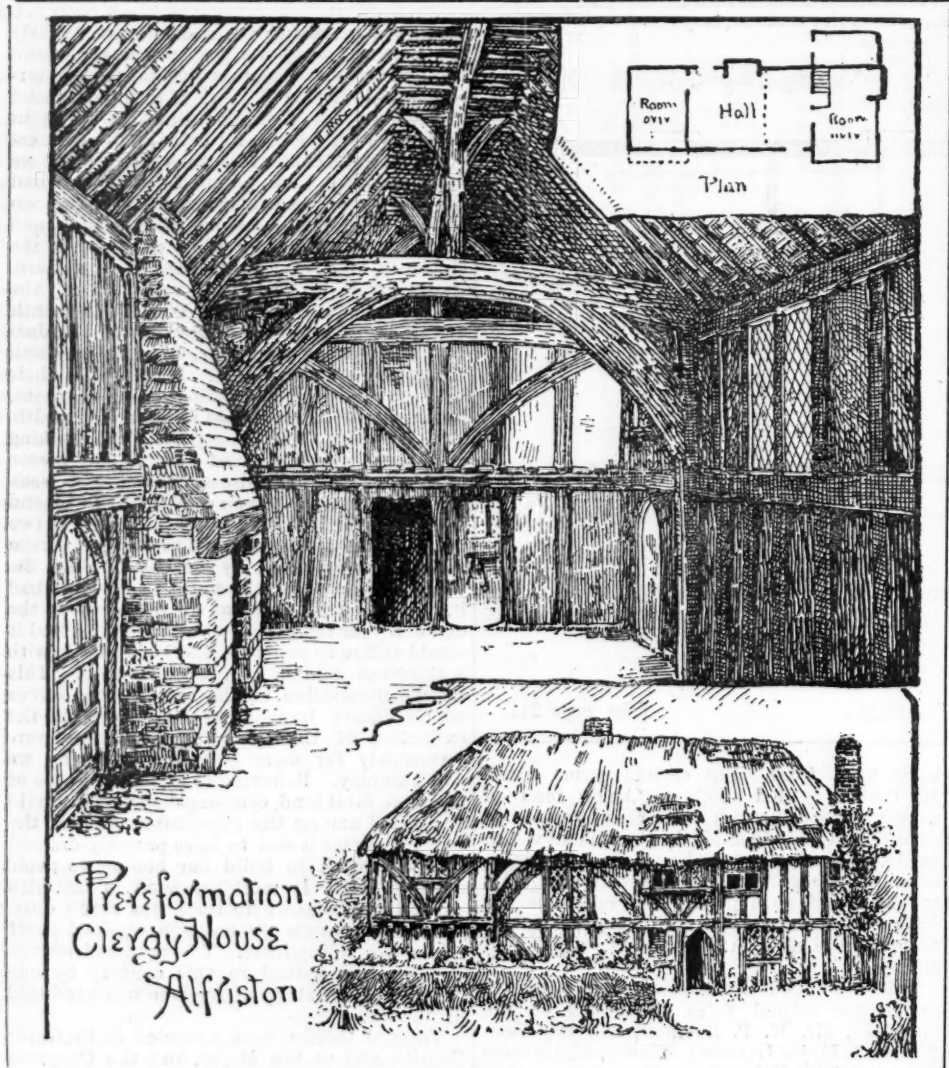
In opening the proceedings, the Mayor offered to place at the disposal of any man of science, for the purpose of giving public sanitary lectures from time to time, the Grand Jury Room.

Dr. Corfield, who gave to his lecture the suggestive title, "Full of Days," said the leading object in all Sanitary Congresses was to preserve health and prolong life. The art of preserving health or hygiene had been practised with great success by the ancients, particularly the Romans, many vestiges of whose splendid engineering for the purposes of pure water-supply still remained. Yet it was the newest of sciences, and from the Romans we might even now take lessons, for even in our greatest cities we were content to take water which we knew to have been polluted. That we had made progress was evident from the disappearance of the terrible scourges of plague and black death which so often prevailed in the sixteenth and seventeenth centuries. In turn, scurvy and typhus, the scourges of the eighteenth and first part of the nineteenth centuries, had nearly disappeared, while against that other terror, small-pox, we were now well protected by vaccination. If they did their best by having cleanly, well-ventilated houses, nature would come to our aid in preserving health. The professor here interpolated a striking calculation which showed how if one person having an infectious disease in the first week of the year gave it to two others in the second week, and each of these were to give it to two others in the third week, and so on, each person giving it to only two, by the end of July the whole population of the world would have had it, and if it could go on at the same rate to the end of a year the people who would have had it would suffice to populate 4,500,000 worlds with a thousand million of people in each. This was an illustration of the fact that the forces which nature brought to bear towards the extinction of these infectious diseases were fortunately far more powerful than any we could employ. Referring to another disease of the more fatal kind, consumption, which should be classed among the preventible diseases, the way to prevent it was to have properly-drained sites on which to build our houses, to avoid overcrowding. It most prevailed in factories and other places where there was much dust, so that here again the question resolved itself into one of cleanliness. The practical advantage we had gained in this country by our devotion to the study of hygiene was a reduced death-rate.

Votes of thanks were accorded to Professor Corfield and to the Mayor, and the Congress was then formally closed.

Among the numerous excursions made, some of which have been mentioned, the most interesting were the visits of the engineers and the sanitary inspectors to the sewage outfall east of Portsmouth at Eastney, to the water company's works and reservoirs at Havant, Bedhampton, and Portsdown Hill, and that of the engineers to the Southampton Water Works. The sources of the water supply of Portsmouth are numerous, springs coming from the chalk, which by some are believed to be capable of yielding a possible supply of 200,000,000 of gallons per diem. The storage here consists of three or four acres of shallow reservoirs covering springs bubbling up from the chalk. At Bedhampton there is a spring called the "blue hole," on account of the beautiful tint of its water. Of course the actual supply falls far short of the possible supply, but 2,000,000 gallons daily are obtained without pumping, while 5,500,000 more per diem are obtained through the pumps. At Portsdown Hill between Havant and Southampton elevated reservoirs contain storage room for 7,000,000 or 8,000,000 gallons. From this point the whole population of the town and dockyard is supplied, the water flowing down by its own gravity and giving to a population of 160,000 the liberal supply of 34 gallons per diem. The mains run (in duplicate) from Portsdown Hill in 24-in., 20-in., 12-in., and 10-in. calibres, besides an extra 12-in. main, specially for the service of the Dockyard. The supply is constant for all purposes,—closets, of which there are 44,000 in the town, drains, and streets, as well as for the higher domestic purposes. The cost of the waterworks was about 400,000*l.*, on which the company always pays the full 10 per cent. dividend. It is proposed that the Corporation should take over the control of the water as so many other corporations have done, but, of course, they will have to give a much higher sum than 400,000*l.* for them whenever they become purchasers.

RETIREMENT OF BELFAST HARBOUR ENGINEER.—We understand that Mr. Thomas Ross Salmond, M.Inst.C.E., of Park House, Belfast, for upwards of twenty-one years chief engineer to the Belfast Harbour Commissioners, has now retired from the Board's service, but intends to act professionally as a consulting engineer and arbitrator.



OLD CLERGY HOUSE, ALFRISTON.

THIS old building is in danger of falling to pieces, for want of funds to carry out necessary repairs. It is a building erected in the fourteenth century, apparently of contemporary date with the adjoining church of St. Andrew, colloquially known as "the Cathedral of the South Downs." It is constructed of oak framing, with the interstices filled in with "wattle and dab." On plan it consists of a central hall (23 ft. by 17 ft.), the entire height of the building, with an open-timbered roof with large cambered tie-beams and moulded king posts. This hall was apparently used as a general living and reception room by the Mediæval clergy. On either side of this hall are smaller rooms, two stories in height (the one end now temporarily used as a reading-room), which were probably the dormitories and offices, &c.

The building was carefully examined in 1890 by an architect who has given special attention to timber-faced houses, and he estimates the cost of an entire preservation at about £450.

The Sussex Archæological Society, at a general meeting, were "of opinion that every effort should be made to secure the preservation of so interesting an example as the old Vicarage House at Alfriston;" and the Vicar of Alfriston, the Rev. F. W. Benyon, is appealing to the public for funds to secure its preservation. Perhaps some of our readers may be able to assist in this good work.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

LOSELEY PARK AND COMPTON CHURCH.

ON Saturday last several members of the Architectural Association visited Loseley Park, near Guildford, under the direction of Mr. F. T. W. Goldsmith. Loseley is one of those interesting houses of the period of the English Renaissance which always form attractive features of the Association visits. We gave some account on the occasion of a former visit to the house by the Association (see *Builder*, July 23, 1887). We may add however one or two remarks to the details then given.

The plan of Loseley House is an interesting example of the Elizabethan successor of the Mediæval hall-type plan of residence. The hall, with its screens and gallery, still remains an important feature, but we have also as separate items the dining-room and the withdrawing-room or parlour, while the stair is now a pronounced and stately feature. In all of these, as in the first-floor chambers, there is a wealth of panelling, of plaster ceilings, and of rich and elaborate chimney-pieces. The drawing-room is the richest in detail, though here, as elsewhere, this is grotesque rather than graceful, rude rather than refined. Little old glass remains, though there is a representation of the arms of the Mores, with the date 1568, in one of the windows of the hall. Some painted panels, with the insignia of Henry VIII. and Katherine Parr, were probably brought from some other house, possibly Nonesuch, and inserted in the pannelling here.

Not merely the house but the park also, and especially the garden, are redolent of the sixteenth century, and the visitors were able to judge of the effect of a "formal garden" with picturesque garden houses, and clipped shrubs. A remarkably fine mulberry-tree probably dates from the time of the adoption of the punning motto of the Mores and the erection of the house. Of old furniture, too, of various dates, there are many examples, though not much of the period of the original house.

Leaving Loseley Park, the party then proceeded by a pleasant walk to the neighbouring Church of St. Nicholas, Compton, a small and simple south-country church, with shingle-covered broach spire, that from the outside has little to distinguish it from many others. Internally, however, it possesses a feature probably unique. The eastern end of the chancel is in two stories, and as the detail is of Late Norman or Transitional character, there is little doubt that the arrangement is original. The lower story forms the sanctuary, some 11 ft. square, vaulted with a massive-ribbed quadripartite vault and open towards the west with a rich Late Norman semicircular arch. Above this arch, and railing off the upper floor over the vaulting, is a wooden balustrade of somewhat slender shafts carrying semicircular arches, as to which there can be little doubt that it is of twelfth-century date, and coeval with the main fabric of the church. The upper story of the sanctuary is, like the lower, open to the chancel and church, and in both cases a piscina exists in the south wall, with every appearance of being original. There can, therefore, be no question that it was intended that those in the church should be able to participate in the worship carried on both above and below. This seems to indicate that we have here an original attempt to combine, in a somewhat different manner to that usually adopted, the functions of a crypt and upper chancel. The use of crypts open to the church was, as we know, very general in western Christendom prior to the middle ages, and it is therefore highly probable that we have here simply what we may call an instance of a crypt at a high level, so to speak. Additional colour is lent to this hypothesis by the existence of a very early tomb on the north wall of the lower sanctuary, thus strengthening the inference that this was of the nature of a *confessio*. The upper sanctuary is now lighted by a modern Decorated window, but in old illustrations prior to the restoration of 1843, a three-light window with semi-circular heads is shown. We may note that the account of Compton in Domesday Book says, "There is a church," which speaks for the antiquity of the foundation. The altar-rail is interesting and of good seventeenth-century design as is also the screen which formerly acted as a chancel-screen, but is now relegated to the western end of the church.

COMPETITIONS.

NEW CHURCH, ABBEYDALE, YORKSHIRE.—A meeting of the Abbeydale Church Extension Scheme Committee was held on the 14th inst. to select the plans for the projected new church. The plans had been previously submitted to Mr. Ewan Christian, Consulting Architect to the Ecclesiastical Commissioners, for his advice and opinion. The committee chose the plans of Mr. Joseph Norton, of Sheffield, which had been favourably mentioned by Mr. Christian. The new church is to provide seating accommodation for 750 people. It will be built of stone, in the Early English style, and will cost 6,000*l*.

GORING-ON-THAMES, OXON.—A limited competition was decided last week for a new chapel at Goring adjoining the present one. The selected design, by "Independent," shows an Elizabethan building treated in such a manner to suit the peculiarities of the site. The authors are Messrs. Cooper & Howell, of Reading, who have received instructions to proceed with the work.

BOARD SCHOOLS, SALFORD.—The monthly meeting of the Salford School Board was held on the 19th inst. at the Salford Town Hall Buildings. On the motion of the Chairman the Board adopted a report of the General Purposes Committee: That they had carefully considered the eight sets of plans sent in for the erection of the new John-street School; and that, after consulting with Mr. Edward Salomons, they were of opinion that the plans submitted by Mr. Henry Lord, of Manchester, best met the requirements of the Board, and provided sufficient accommodation after allowing for wasted space. The recommendation of the Committee on this point was agreed to. The architects for the proposed enlargement of the St. Margaret's School were Messrs. Woodhouse & Willoughby, of Manchester, chosen from the eight competing firms. For the enlargement of Ordsall Schools Mr. Henry Lord was instructed to prepare plans.

NEW WORKHOUSE AT PATRICROFT. — The Guardians of the Barton-upon-Irwell Union for some years have had strong pressure brought upon them by the Local Government Board to erect a new workhouse, and make better provision for the sick and aged people, and also for the imbeciles. They some time ago purchased the old mills belonging to Messrs. Waddingtons, which adjoined the present workhouse, and, having made arrangement to erect the new buildings by instalment, have let the contract for the largest portion of the buildings for aged and infirm pavilions for the administration buildings to Messrs. Southern & Sons, by public competition, for the sum of 16,250*l*. When these pavilions are completed, they will be temporarily occupied by the inmates now in the hospital until the new building for them is erected upon the site of the old hospital buildings. The total accommodation when completed will be about 500 inmates. Messrs. Maugnall & Littlewoods, of Manchester, are the architects whose plans were recommended by the Local Board from competition designs by several architects.

Correspondence.

To the Editor of THE BUILDER.

THE INSTITUTE AND ARCHITECTURE.

SIR,—The experience gained in some years of pleasant association with various future practitioners leaves me in no doubt about the value to the student of an *intelligent* examination. It lays down for him a useful course of study, and gives emulation and a purpose to his work.

What would a University course be worth if even the best intentioned men went up for three years' work with no defined standard to be reached, no boundaries to be passed, or prizes to be taken?

Why should the embryo architect be left to develop his own genius, if perchance he is one of the few with heaven-born instinct?

The examination is not to test how far he is an artist in his craft, but whether he has had the necessary grounding and drilling, without which the artist's inspiration is worth little in any branch of the Arts.

If an examination is accepted, may we not consider that a distinction should be drawn between a "design" intended to represent architecture, and an executed work which may be "architecture?" A student may be examined in design, as a test of his capacity to put his ideas on paper, or, in other words, to express himself grammatically. Confined to these lines there would be no examination in "art," and no inconsistency in maintaining that in the election of Fellows a general consensus of opinion on the quality of the candidate's work should be sufficient.

The latter expression of opinion should be insisted upon, and the Institute should relinquish the custom of admitting any respectable father of a family, however damnable his productions.

ERNEST GEORGE.

SIR,—The letters you publish from Mr. Belcher and Mr. Brydon relate solely to the internal economy of the Royal Institute of British Architects, and would not have justified any notice from those who do not belong to that body had it not been for your leading article last week.

You remark that it is at all events possible to understand what those gentlemen want, which is hardly the case in regard to the outside dissentients. You go on to say that we outsiders,—the memorialists,—have demanded that the Institute should accept our views, and that as it will not do so we "cut the connexion" and abuse it.

May I be allowed to point out that this description does not, so far as I can judge, in the least explain our attitude? You say it is impossible to understand what we want. This is but natural, because we do not want anything. We do not want to be examined, labelled, certificated, and registered. We do not want to be pronounced gentlemen by Act of Parliament. We do not want to enjoy any legal privileges or monopolies, or to shut out other people from employment. It is not we who are the aggressors in this dispute. We only ask to be left alone and allowed to go on as we are. These questions are not of our raising, and because when they are raised and forced upon us we try to show that the interference of the Legislature with our liberty will do no good, but rather a great deal of harm, it is a little unfair to turn upon us and ask what then is it that we *do* want. We have never asked for anything.

It is just the same with our attitude towards the Royal Institute of British Architects. We have never "demanded that the Institute should accept our views." It is quite free to go on with its examinations so far as we are concerned, provided it keeps them to itself. Our opposition begins only when the Institute attempts to force them on all who aspire to be architects, and to do in its own way what the registrationists tried to do in theirs. The Institute on its old footing had the opportunity of doing very useful work. Its prizes, scholarships, library, and lectures were excellent. As a club or society of architects for discussion and mutual improvement, there was plenty of useful work before it. It is only when the Institute attempts to pose as a *censor artium*, and to pronounce on the fitness or unfitness of a man to practise architecture,—when it claims the right to sweep us all into its net, and quarrels with us because we object to be swept up, and do not value its *imprimatur*,—that we first feel the stirrings of resentment. Here again we object to the quarrel being fastened upon us. We made no demands upon the Institute, and simply defend ourselves against invasion. Let the Institute close its barriers, and pile examination on examination as much as it pleases, so long as it gives up its pretensions to represent architecture, and we shall not complain.

How its present policy will affect the Institute it is not difficult to foresee. It will prevent young men who view architecture seriously from joining its ranks or remaining if they are members. By the recent resignation of Messrs. Reginald Blomfield, May, Macartney, Horsley, Simpson, Newton, and Prior, the Institute has lost its men of the greatest promise. If its present policy is persevered in a further secession may be looked for, and the Institute will become more and more what some say it is already in a great measure,—the home of the surveyor-architect, the mere man of business.

May I, in conclusion, point out the unfair use that has been made in the present controversy of the word "surveyor?" Surveyor, in its old sense, meant the man who designed the building and *surveyed*,—that is, *supervised*,—its performance. He was, in fact, the architect, as we now call him. The word "surveyor" now means something else; and it surely cannot be seriously maintained that because Wren was spoken of as surveyor, therefore the "Light and Air" men are architects.

THOS. G. JACKSON.

SIR,—The letters of Mr. Belcher and Mr. Brydon, and your very temperate and just article occasioned by them, will serve to recall the thoughts of your readers to subjects which occupied a good deal of attention last session. On some of those subjects I hope to speak in the public lecture which I customarily give at the commencement of my course at University College; but the question of the mode of electing Fellows of the Institute is one on which I shall be glad to be allowed space in your columns for a few remarks.

In your article you say that "we believe some members of the Institute contemplate even an examination test for Fellows" apart from the idea of electing them only from among the Associates. A provision of the new charter contemplates this test as at any rate possible; and the "some members" who advocate the idea will, I believe, be found to include some very energetic and influential men. I wish to deprecate the step very strongly.

An examination following closely upon a course of study may be so framed as to give tolerably good evidence that the student has, or has not, profited to a reasonable extent by that course. An examination conducted like those at the Institute, or those of London University, by examiners who have not been the teachers of the candidates, cannot go even so far. The latter class of examination shows little or nothing more than that at the moment of presenting himself a candidate is or is not possessed of certain information; and I have had enough experience of both sorts of examination to justify my speaking with some confidence. I contend that examining a candidate for the rank of F.R.I.B.A. is not at all the sort of precaution which ought to be taken, and procedure which ought to be followed, in order to be sure that a professional man is a fit person to hold the rank of a senior member of the professional society connected with his calling. Not only would the adoption of such an examination as a preliminary to electing Fellows be, as you put it, taking up a position which has never been taken by a corporate society similar to the Institute before, but it would be a suicidal policy. The professional man of fair repute, long experience, and tried skill will not usually feel disposed to submit himself to a disagreeable ordeal for the sake of attaining a rank in the Institute which he ought to step into as a matter of course. It will not be worth his while. It will be the keen, clever, pushing, and possibly not over-scrupulous man, to whom attaining Fellowship would be something like changing into a better suit of clothes from a shabby one, who will gladly take the trouble to coach up for and pass any kind of examination which will give him (as the Associateship examination is now felt to do) a claim to be treated with forbearance at the ballot-box. To these objections the scheme of selecting Fellows from the ranks of the Associates is not open; and that scheme has the incidental advantage that it will give additional value to the existing examinations.

The question would remain, were such a scheme adopted, how best to provide an admission to Fellowship in exceptional cases; that is to say, how to elect architects who have not passed through the stage of Associateship, and who yet ought to be Fellows; and I for one would be quite willing to see such admission made much more difficult than it now is. It appears, on the whole, desirable to make such a mode of entering the ranks of Fellows possible but exceptional. I beg to suggest, as a convenient mode of procedure, that it should be arranged that a memorial signed by architects, or others, should first be addressed to the Council representing that A. B. desired to offer himself for election, and setting forth the special circumstances and reasons why, in the judgment of the memorialists, he should be allowed to do so; and that this memorial should be supported by any evidence of any sort,—drawings, photographs, literature, expressions of opinion, which the memorialists like to adduce. If the Council, after judging of the memorial, and the means of forming an opinion possessed by those who signed it, and the value of the evidence adduced in support of it, decides to grant the request of the memorial, then the candidature and election should proceed as now; only that the memorial and all the evidence in support of it should lie on the table of the Institute, and be summarised in its Proceedings. If this course is adopted, it will not often be had recourse to, and, that only in the case of men whom the Institute would not like to lose. The rule as to seven years' practice would then be, of course, abolished.

T. ROGER SMITH.

SIR,—In this most interesting and valuable correspondence everything seems to turn on the meaning of words, especially "architect" and "architecture," and, at the bottom of the controversy, "What qualifications should enable a gentleman to call himself an architect?"

The most interesting work on the subject, and that which, by the nature of the publication, should be an authority and carry weight with all our members, is the "Dictionary of Architecture." Under the article "Architect" is this:—

"In the modern acceptation of the term, an architect is one who both furnishes the designs and superintends the execution of buildings. However graceful and artistic the design which the architect may produce, he is at the best a mere draftsman unless he possesses the practical knowledge necessary to enable him to carry them into effect, while the builder who may have ability and experience sufficient to erect an ordinary building planned by himself *cannot with any propriety assume the title of architect* unless he also exhibit taste, invention, and a thorough acquaintance with the style he may have adapted.

To acquire a leading position in his profession the architect must display integrity, &c., combined with the various acquirements indicated in the Article 'Architecture.'"

That is, you cannot with any propriety *assume the title of architect* unless you are a practical builder who has studied (as well) the art of architecture and acquired, by the possession of creative genius, the faculty of designing and adapting the art of architecture to every-day building of every kind.

Also if it is your practice to use your own skill, as enumerated above, in designing the building work with which you may be entrusted, and are and behave as an honest man in whom your client can have perfect faith, then and then only you are entitled "with propriety" to call yourself a professional architect; otherwise, call yourself what you may, without all these qualifications you are nothing more than a consulting building expert, and I would suggest that it is the Institute's failure to recognise these facts that the present crisis exists.

This crisis (alluded to by others) is, I believe, that many members intend that our Society shall reform, for they consider that it has been and is thoroughly ignoring the greatest of all qualifications that signify the term "Architect."

It is generally known that many men have contemplated resigning, but have been induced to remain in the Society and help to change things for the better and, if possible, so to alter and direct its present policy that many of its members who have recently resigned may be induced to join its ranks again.

The following are some of the reforms I think might tend to this end:—

1. The examination to be re-named an examination in building.

2. A re-arrangement of the classes, and instead of in future creating any more Fellows as at present, to have two classes in its place, viz., "Architect Fellows" and "Surveyor Fellows." The only difference between them being that the former would be required to submit photographs and working drawings of some of the buildings they have executed, which would have to pass a special committee and be exhibited for voting on by the electorate. It must be borne in mind that the framers of the Charter seem to have contemplated

something like this, for in it they distinctly provide for the creation of new classes of subscribing members.

3. A representative Committee to define and publish the qualifications and duties of gentlemen connected as architects or surveyors with the business of building, for our Society must always have good honest professional men among its members capable of everything except architecture. Surely surveyor is good enough title for these gentlemen, but new definitions of the words as understood to-day should be published, for in old days, and even at the present day, in special cases the term architect and surveyor are synonymous.

4. A re-christening of the Institute either as an "Institute of Architecture," as Mr. T. G. Jackson suggested, or an "Institute of Architects and Surveyors."

There are other minor matters, but to me these are largely at the bottom of the difficulty.

SYDNEY VACHER.

VESTRIES AND HOUSE DRAINAGE.

SIR,—Referring to your article of last week, *re* Vestry regulations and house drainage, it may surprise some of your readers to hear that the Vestry of Camberwell forbid the use of properly-coated iron drain-pipes, not, I have been told, because their officers object to them, but because they cannot depart from a set of hard-and-fast regulations passed by the Local Government Board.

I have had over sixteen years' study and practical experience in sanitary work, and having noticed the way in which, as you point out, properly-coated iron drain-pipes have been coming into vogue, I cannot see the justice of Vestry Regulations boycotting them by permission of the Local Government Board. But perhaps the Local Government Board and a number of vestries are not yet aware that the Office of Works are large users of these pipes.

A. HENRY FREND.

The Student's Column.

CONCRETE.—XIII.

WATER.

WATER is necessary for the setting and hardening of hydraulic limes and cements. It does not form a merely mechanical mixture with these in the way it does with pure hydrate of lime, but it unites chemically with them, as we have already seen, forming new compounds of an indurating nature. It is evident, therefore, that the quantity of water added to cement or hydraulic lime is of no little importance. If too little be used, some of the cement remains more or less in the form of powder and cannot attain to that cohesive and adhesive strength for which it was intended; and the mortar or concrete is pervious to moisture, and therefore more liable to destruction by frost and atmospheric agencies. On the other hand, there is no doubt that an excess of water is injurious to the strength of the cement, whether neat or mixed with sand. The water is scattered in little globules throughout the paste, and around these the cement sets; gradually the water evaporates, and on the briquette being broken, little globular cells, in which the water-drops had lain, are disclosed, and are seen at once to be a source of weakness. Excess of water also retards the hardening of the concrete, and there is the further danger that it may wash away some of the finest and best particles of the cement during the operation of mixing with sand and other material.

In Chapter XI., Table XV., we gave the quantities of water used in Germany in making test briquettes, both neat and with sand. For neat cement, about 25 per cent. (by weight) of water is used. But we must remember that this is for making briquettes in laboratories, where, it may be expected, no water will be allowed to run to waste or be lost by evaporation, and where none will be absorbed by any surfaces with which the briquettes come in contact. This is vastly different from the conditions which obtain in practice, where water may drain away from foundations into the ground, or drip through the centreing of floors, or be evaporated by the heat of the sun, or dried by passing winds.

Gillmore is of opinion that concrete, "when ready for use, should appear quite incoherent, containing water, however, in such quantities that a thorough and hard ramming will produce a thin film of free water upon the surface under the rammer without causing in the mass a gelatinous or quicksand motion."

Mr. H. K. Bamber says that good cement requires for its thorough induration 40 lbs. (*i.e.*, 4 gallons) per cubic foot of cement. If we take the weight of such a cement at 112 lbs. per bushel, or 87 lbs. per cubic foot, it will be seen that he advocates the use of 46 per cent. (by weight) of water with cement. This is so much in excess of any other quantity which we have seen advocated for neat cement that we think Mr. Bamber must refer to cement when used in concrete with materials which are, of course, more or less absorbent. Some experiments made by him in 1889 and 1890 are, however, of considerable interest in this connexion.* He made six blocks of concrete, all consisting of one part new Portland cement, 2 parts sand, and 4 parts shingle. Two of these (A) were made with the "full quantity of water that the cement would take up," namely, 10 lbs.; two (B) were made with 7½ lbs. of water; and two (C) with only 5 lbs. They were allowed to harden for two weeks, and then one of each kind was placed on a sea-wall, where they remained for a year, being covered and uncovered every tide. They were then taken and broken through the middle. The block (A) was "very hard and perfectly sound and dry quite through to the surface;" (B) was "dry in the middle, but on every side the water had penetrated about 3 in. and had much weakened the block;" (C) was "wet quite through, and was very easily broken up, the water having been able to percolate continually through the block, and having dissolved much of the lime." The other three blocks were kept in fresh water for twelve months "with exactly similar results as to penetration of water and strength of blocks," but the water in which block (A) was immersed "remained clear," that containing (B) "became milky and turbid from the formation of carbonate of lime," and that containing (C) "became quite white, and . . . . the whole block was covered with crystals of carbonate of lime, ¼ in. to ½ in. in thickness. The lime had been gradually dissolved, and crystallised on the surface in the form of carbonate of lime."

It is now generally conceded that it is better to use too much water than too little, but it is best, of course, to use the right quantity, neither more nor less. Mr. E. C. Clarke thinks that concrete requires from 21 to 23 gallons per cubic yard. Mr. A. E. Carey said at the Institution of Civil Engineers (1891) that he had obtained the best results by using about 22 gallons of water per cubic yard of raw materials, or about 1 part by volume to 7½ or 8 parts, "less than this not securing that glassy film upon the surface of work which is so desirable, and, more than this, washing away some portion of the soluble alumina silicates [*sic*] which are the active ingredients in concretion." He found the crushing strength of small cubes (about 1½ in. each way) to be as follows:—

TABLE XVII.

Weakness of Cement mixed with insufficient Water.

Cement.	Normal Sand.	Fresh Water. per cent.	lbs. per sq. in.
1	3	20	1679
1	3	10	1425 (average).

Fresh cement will take up more water than stale cement. A smaller quantity of water can be used in concrete if this be well rammed.

Another experiment which Mr. Bamber made inculcates a useful lesson. A box 18 in. cube, containing, therefore, 5,832 cubic inches, was completely filled by the mass of concrete which resulted from the mixing of the following ingredients, measured separately:—1,296 cubic inches Portland cement, 2,592 cubic inches sharp sand, 5,184 cubic inches shingle, and 30 lbs., or 829 cubic inches water. These ingredients, not including the water, have an aggregate measurement of 9,072 cubic inches, but on being mixed together the voids in the larger material were filled by the smaller to such an extent that a shrinkage of 3,240 cubic inches took place. Exactly the same quantities of cement, sand, and shingle were mixed with 15 lbs., or 415 cubic inches, of water, with the surprising result that the box would only contain seven-eighths of the mixture; in other words, the ingredients, on being mixed together, shrank only about 2,407 cubic inches. The voids, or interstices in the latter concrete therefore exceeded those in the former by about 833 cubic inches. This shows that concrete mixed with its full quantity of water is more dense, and therefore less permeable to water, than concrete made with an insufficient quantity. There is this also to be said in favour of erring a little on the side of excess rather than insufficiency, that good cement has the property of exuding surplus moisture to a considerable extent in the process of setting. And some excess, as we have already said, must be provided in order to make up for loss of moisture, which may occur through contact with dry absorbent surfaces such as the wood staging under a floor or roof, and the earth or gravel in many foundations, or again through evaporation. In many cases, the injurious loss of moisture by evaporation is prevented by covering the concrete for a week or more with a shallow pool of water, or with a layer of sand or sawdust kept continually moist, or with straw, sacks, &c., which protect the concrete from the direct action of the sun's rays and of wind. Table III., Chapter III., showed that briquettes of various hydraulic limes and sand kept in water (*after having set in air*), are from 30 to 105 per cent. stronger than similar briquettes kept in air, while the strength of Portland cement is approximately the same in both cases. Concrete, however, *deposited* in water is invariably weaker than concrete which has set in air. Concrete, even of Portland cement, exposed to a dry atmosphere, and especially to a dry warm atmosphere, cannot attain its proper strength, so that even this, although it does not suffer perhaps to the extent to which hydraulic limes suffer, is injured by lack of moisture during the process of setting.

We ought not to omit to mention the fact that all aggregates are more or less absorbent, and that some of them, especially coke-breeze and the like, if used dry, greatly injure concrete made with them by drawing from the mixture the water necessary for the proper hardening of the cement. In order to prevent this, all aggregates ought to be moistened before being made into concrete; the process of washing the aggregate effects this, and is, therefore, most useful and economical when carried out immediately before the aggregate is mixed with the cement. This proper moistening of the aggregate is a matter of great importance.

Mud of any kind, held in suspension by the water, is detrimental to the concrete made with it. Mr. Carey found that briquettes made with a certain kind of cement, mixed with 20 per cent. of distilled water, required three hours to set, and at the end of seven days had an average tensile strength of 480 lbs. per sq. inch, while other briquettes, similar in every respect, except that 1 per cent. (by volume) of dried and finely-powdered Thames mud was mixed with the water, took four hours to set, and broke with 411 lbs., that is to say, over 14 per cent. less than those mixed with pure water.

Water containing organic matter is also more or less injurious, and consequently green and stagnant pools ought not to be used for mixing in concrete.

But not only is mud or other matter held in suspension by the water injurious to the cement with which it is mixed; matters dissolved in the water also may prove harmful. Such substances as sugar, soda, and salt are, in frosty weather, sometimes dissolved in the water used for making concrete, either for the purpose of lowering the freezing point of the mixture and so allowing it to be manipulated at a time when fresh water would be frozen solid, or for the purpose of preventing or, at any rate, minimising the damage which might possibly be caused to the concrete by frost coming before it had set sufficiently. Until there is more information on the subject, we shall be justified in believing that Portland cement is ultimately strongest when mixed with distilled water and nothing else; all additions, whether of mud, or sand, or ordinary aggregates, or of sugar, salt, or other dissolved substances, are a source of weakness. The use of sugar, however, with fat limes, and probably with hydraulic limes and natural cements, is attended with advantage. The increase of strength caused by adding a small quantity of sulphuric acid to fat and hydraulic limes has already been shown in the chapter on Selenitic limes, and the disadvantage of adding it to Portland cement has also been mentioned.

The strength of cement does not differ very much whether it be gauged with fresh water or with sea-water. Apparently the sea-water briquettes are the stronger at early dates; but after a few months the fresh water ones take the lead, and continue to give the best results. It must be said, however, that experiments are somewhat contradictory on this point. Mr.

* See *Proceedings Institution of Civil Engineers*, Vol. CVII. (1891-2), Part I.

M. J. Powers in America has tested 3,500 briquettes made from seven kinds of cement, with the object of ascertaining the influence of sea-water. He found that the strength of both natural and Portland cements mixed with salt-water was, at the end of one month, 30 per cent. more than when mixed with fresh water, but this gain of strength was found to vanish during the second month in the natural cements, and during the third month in Portland cements; thenceforth the fresh-water briquettes having the advantage. His conclusions are that "there can be no doubt that cement mixed with sea-water gains considerably in strength during the first few weeks, but that it does not hold out is clearly shown by these results. . . . . The gain also seems to be greater and more permanent with the Portland than with the natural cements. The effect of using a 10 per cent. solution seems not so good as with a 3 per cent. solution." Some experiments by Mr. Carey show little variation in the strength of briquettes, whether gauged with—1, fresh water; 2, half distilled water and half sea-water; 3, quarter distilled water and three-quarters sea-water; 4, sea-water, 25 per cent. evaporated; 5, sea-water, 50 per cent. evaporated. The greatest difference at one month was 3·2 per cent., 4 being strongest; at two months 4 per cent., 4 again strongest; at three months 26 per cent., 5 being strongest and 4 weakest; at six months 35 per cent., 1 strongest and 4 weakest; at nine months 8·2 per cent., 5 being strongest and 4 weakest; and at twelve months, 27 per cent., the following being the tensile strengths in lbs. per square inch at this date,—1, 678; 4, 605; 2, 592; 3, 575; and, 5, 495. It will be seen that the fresh water briquettes come to the front at the end of a year, but the results of the various tests are so strange and irrational that we cannot attach much importance to them. The tests by Mr. Powers are more likely to be accurate.

Cement gauged with sea-water sets more slowly than with fresh water. Sea-water has the advantage of having a lower freezing-point than fresh water, and work can, therefore, be carried on with it at times when fresh water would be frozen. It ought not, however, to be used in the walls of buildings or in stucco, as it has the property of attracting moisture, and of causing an efflorescence on the surface of the material with which it has been mixed. Again, sea-water ought not to be used in concrete which will come in contact with ammonia, as in the paving of stables, shippens, chemical works, &c. But for foundations, retaining walls, and similar work sea-water may be used instead of fresh, if more convenient

Sometimes, especially in winter, warm water is used for concrete, but is of doubtful advantage as far as strength is concerned. It has, however, the effect of causing the cement to set sooner, and for that reason it may, in certain cases, be employed.

GENERAL BUILDING NEWS.

THE REPAIRS TO LINLITHGOW PALACE. — The alterations and repairs to Linlithgow Palace, carried out by Mr. R. Philip, are now, says the *Scotsman*, completed. The principal parts on which improvement has been effected are the King's kitchen, Old Parliament hall, Chapel-Royal, priest's residence, and "The Confessional." The floors have been laid with concrete of a reddish tint. According to the terms of the Government grant, further repairs will be made next season, when, it is expected, a fountain also will be erected in the grounds.

RESTORATION OF PARISH CHURCH, LLANTHONY (MONMOUTHSHIRE).—The parish church within the precincts of old Llanthony Abbey is to be restored. Mr. J. James Spencer, of Abergavenny, is the architect. Most visitors to the ruins know of the dilapidated state the church is in. Funds are much wanted to carry out the work, as only a very small sum can be raised in the parish.

NEW CHURCH, SMALL HEATH, WORCESTERSHIRE. —On the 17th inst. the foundation-stone of the new Church of St. Oswald, in course of erection at Small Heath, was laid by Mrs. C. Wriothesley Digby. The architect is Mr. W. H. Bidlake, M.A., of Birmingham, and the church will consist of a chancel, a nave, and aisles of six bays. On the north side of the chancel there will be an organ-chamber and clergy-vestry, balanced on the south side by a transept and the choir vestry, the two vestries being connected by a passage behind the altar. The walls will be finished in Leicester sand-brick, with Bath stone dressings, the nave piers will be of Hollington stone, and the roofs tiled. The style adopted is the Transition from Early English to Geometric Decorated. The portion of the work at present undertaken consists of the whole east end and four bays of the nave and aisles, with a temporary west front, leaving the two remaining bays with the tower and spire for a future effort. Mr. T. Rowbotham, of Small Heath, is the contractor, and the estimate is 4,823*l*. The portion of the church now in progress of erection will accommodate 460 worshippers.

NEW SYNAGOGUE AT HAMPSTEAD. — A new synagogue, situated in Dennington Park-road, West Hampstead, was consecrated by the Chief Rabbi on the 18th inst. The synagogue has been built by Messrs. John Allen & Sons, from the designs of the architect, Mr. Delissa Joseph. The principal elevation, which is Romanesque in character, has been carried out in red brick and red stone, and comprises a central tower flanked by secondary towers, containing the staircases. The building is provided with seven exits, all the doors of which open outwards. The main building is in the form of an octagon, the corners of which are occupied by columns carrying the gallery, and from the tops of the columns spring the ribs which form the dome, which is constructed of steel. The gallery is placed in the aisles, which follow the lines of the octagon. The ark, which is in the form of a domed temple, is placed in an apse recessed from the eastern side of the octagon. The choir is at the back of the ark, the voices reaching the synagogue through wrought-iron grilles. Immediately in front of the ark platform is the reader's platform, reached by two staircases, describing quarter circles, the pulpit being in front of the reader's platform. Cloak-room accommodation is provided at each level. The scheme of decoration is pure white throughout. The building is lighted by two ranges of windows and by clearstory lights. The capacity of the building is for 656 sittings, and it has cost about 11,000*l*.

METHODIST CHAPEL, HORNSEY.—Memorial-stones were laid on the 15th inst. of a new Methodist Chapel, situated in the Willoughby and Hampden-roads, Hornsey. The internal dimensions of the new chapel will be 58 ft. 8 in. by 51 ft. 3 in. Mr. Robert Curwen, of Palmerston-buildings, is the architect. In addition to the chapel are to be built an infants' class-room, additional vestries, and a chapel-keeper's house; the whole group being estimated to cost 6,000*l*.

ADDITIONS TO THE STAFFORDSHIRE GENERAL INFIRMARY.—The erection of the new north wing to the Staffordshire General Infirmary is being rapidly proceeded with. The walls, says the *Staffordshire Advertiser*, are now all but completed. The architect is Mr. Aston Webb, of London, and the contractor is Mr. F. Espley. Mr. H. T. Pebworth is clerk of the works.

EXTENSION OF THE CLINICAL HOSPITAL, MANCHESTER.—The new wing of the Clinical Hospital for Women and Children, Park-place, Cheetham Hill-road, Manchester, was opened on the 19th inst. for the accommodation of out-patients. The wing has been built upon the site formerly occupied by two dwelling-houses adjoining the main hospital building, and fronting Cheetham Hill-road. Among the apartments are a waiting-hall, a range of dispensaries, and the necessary consulting-rooms for the surgical staff. Messrs. Mangnall & Littlewood, of Manchester, designed the building.

RESTORATION OF ST. AUGUSTINE'S CHURCH, NORWICH.—St. Augustine's Church, Norwich, which for many months past has been in the hands of the builders for purposes of renovation, was re-opened on the 11th inst. The church, according to the *Norwich Mercury*, underwent a partial restoration in 1879. In that year it was re-seated with pitch pine, the chancel roof was renewed, and a ringing floor built in the tower. Little else was done owing to lack of funds. Last year the parishioners were reminded of the dilapidated condition of the church when several windows were blown in. In December last a new east window was inserted, and about the same time a carved oak reredos was erected by Mrs. Hotblack. During the present year fresh windows have been provided. New buttresses have been built; the plaster cement, which for the past 150 years has covered the outside walls of both nave and chancel, has been picked, revealing a surface of ordinary flint stones, a new south porch has been put up, and the church has been drained. The designs, prepared by the late diocesan architect, Mr. R. M. Phipson, and partially executed twelve years ago, are now finally carried out.

NEW MALTINGS AT NEWARK.—New maltings are about to be erected at Newark for Sir W. Gilstrap, Bart. The buildings will occupy a site between Cow-lane Wharf and Northgate, adjoining the Wellington Foundry, and will comprise three malt-kilns, a barley-drying kiln, and malt and barley stores. Messrs. T. G. Mackenzie & Sons, of Newark, have secured the contract for the erection of the maltings, and the sub-contractors for the brick and stone work are Messrs. George Brown & Son, also of Newark. The amount of the tender was 21,675*l*. Messrs. Evans & Tolley, of Nottingham, are the architects, and Mr. Charles Kendall is to be clerk of the works.

SURVEYORSHIP.—Mr. F. Wood, C.E., Assistant to the Borough Engineer of Leicester, has been appointed by the General Works Committee of the City Council of Wakefield to the position of Assistant Surveyor, who is to carry out the sewerage and sewage disposal schemes for that city.

SANITARY AND ENGINEERING NEWS.

EASTWOOD AND GREASLEY SEWERAGE. — In December last the Barford Rural Sanitary Authority sanctioned the appointment of a local committee to consider the best means for the disposal of the sewage of Eastwood and Greasley, and they decided that Mr. Herbert Walker and Mr. W. H. Radford, civil engineers, both of Nottingham, should be invited to submit plans and the committee to decide which was most suitable. These plans were submitted last March, and, after an inquiry into the merits of both schemes, the committee recommended that Mr. Herbert Walker be appointed the engineer to carry out the proposed works. The system advocated by him is that known as the "International," and the Rural Sanitary Authority appointed a deputation to visit certain places where this system is in operation, and they were so satisfied with what they saw of the results of this process that the Authority unanimously accepted the report of the committee, and Mr. Walker was appointed the engineer for the undertaking. Plans will be submitted for approval by the Local Government Board in due course.

THE CARDIFF WATER SUPPLY. — On the 14th inst., Alderman David Jones, Chairman of the Waterworks Committee of the Cardiff Corporation, opened a new reservoir near to the Brecon Beacons for supplying the town with water. The reservoir is one of three which the Corporation in 1884 obtained power to construct in Taff Fawr Valley, 32 miles from Cardiff. It has been six and a half years in construction, and has cost 374,800*l*. The area of the gathering ground is 4,000 acres. The ground stands at an elevation of 1,080 ft. above the sea at the embankment; and the water is declared to be of exceptional purity and softness. The reservoir, which has been named the Cantreff, is three-quarters of a mile in length; its greatest depth is 82 ft.; and it has a capacity of 322,000,000 gallons. The embankment is 460 ft. long and 120 ft. high, while the width at the top is 30 ft. Passing through the embankment by means of a brick tunnel 600 ft. long and 13 ft. in diameter the water enters an aqueduct 32 miles in length. In order to reduce the pressure this aqueduct is divided by balancing reservoirs into four sections. The first is to Cefn, 5½ miles; second, to Blackbrook, 9½ miles; third, to Rhubina, 14½ miles; while the fourth section, 2½ miles, terminates in two service reservoirs at Llanisben and Lisvane, which together have an area of eight acres. In its course down the valley the aqueduct passes through eleven towns or places. The gathering ground of the two reservoirs yet to be constructed is 6,400 acres, and when the whole scheme is completed Cardiff will possess a supply equal to 1,220 million gallons, sufficient for the requirements of the town, even at its present phenomenal rate of growth, for the next thirty-five years. Mr. J. A. B. Williams, C.E., was the engineer-in-chief of the works.

FOREIGN AND COLONIAL.

FRANCE.—The Académie des Beaux-Arts has definitely accepted the legacy which the late M. Bailly left. He was the architect who presided for a long time over the Society of French Artists.—— An employé of Messrs. Hachette has just presented to the Carnavalet Library a curious collection of about 100,000 articles and scraps cut out of the newspapers by himself during the last sixty years. ——The restoration of the portal of the Church of St. Nicholas des Champs is now being carried out. It is one of the most interesting historical monuments of Paris.——A new lighthouse, with a red light, is to be started on October 1, at the mouth of the Seine, on the dyke near Quillebœuf, below the mouth of the Lillebonne river.—— The municipality of Saint Malo, who decided last year to erect a statue to the Corsair Surcouf, the execution of which was put into the hands of M. Etienne Leroux, now wish instead to have a statue of the navigator Jacques Cartier.——A competition has just been opened by the town of Lorient for a large building which is to comprise an elementary school, a professional school, and a salle des fêtes. The cost will be about 400,000 francs.——A subscription has just been started at Quimper for the erection of a monument to the memory of Mgr. Lamarche, which is to be placed in the cathedral. Mgr. Lamarche, who has lately died, was Bishop of Quimper and Léon.——Last week a monument to Dr. Gosset was inaugurated at Fécamp.——M. le Baron Alphonse de Rothschild has just presented the museums of Grenoble, Chambery, and Cahors with several pictures, statues, and marbles.——The General Council of the Rhone has confided to M. Louis Rogniat, architect, the direction of the works of the new Hôtel de la Préfecture. The young architect, who is a son-in-law of M. Louvier, is a clever artist, with a good deal of taste.——In making some excavations at Toulouse, on the Place des Carmes, two statues have been discovered, one representing a saint and the other a martyr; they have been taken to the museum.——A curious tomb has been discovered at Saintes, dating about the thirteenth century, and containing some jewellery and other objects.——The death is announced at Aix-les-Bains of M. Lavau-Revel, landscape painter. He was a pupil of Guillemet and Bouguereau, and

CONTRACTS AND PUBLIC APPOINTMENTS.

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Sewerage Works	West Ham Council	Lewis Angell	Sept. 27
*Oak Fencing and Gates	do.	do.	do.
Flagging, Paving, &c.	Plymouth Corp.	G. D. Bellamy	do.
New Street	do.	do.	do.
Sewerage and Drainage Works	Newcastle-under-Lyme Town Council	J. Pattison	Sept. 28
Street Works	Longton (Staffs.) T. C.	J. W. Wardle	do.
School Buildings, Baring-street	South Shields Sch. Bd.	T. E. Davidson	do.
Infirmary, co. Durham	Easington Guardians	Lamb, Armstrong, & Knowles	do.
Portland Cement	Manchester Ship Canal Co.	*Official*	Sept. 30
Waterworks (Contracts Nos. 1-4)	East Waid (Appleby) U.R.A.	G. Watson	do.
		G. Sutherland	do.
Villa Residence, Forres, N.B.		*Official*	do.
*Erection of Battery, Drill Shed, &c.	Admiralty	E. G. Mawbey	do.
*Refuse Destructor Cells, &c	Leicester Corp.	do.	do.
*Engine, Boiler, &c.	do.		
Roads, Sewers, &c. Ty-yn-y-Coed, near Cardiff		Mrs. Mackintosh	Oct. 1
Overflow Sewer	Warrington Corp.	C. Rigg	Oct. 3
Pavements, Kerbing, &c.	Rhymney Local Board	T. Longdin	do.
Iron Castings, Fire Bricks, &c.	Lancs. & Yorks. R. Co.	*Official*	do.
*Schemes and Estimates for Heating Baths	Coventry Baths Com.	do.	do.
*Construction of the Main Sewerage	Tonteth Park Loc. Bd.	Harold T. Burgess and Spalding & Cross	do.
*Supply of Coal	Aldershot Local Board	J. Price	do.
*Supply of Granite	do.	B. Rushford	Oct. 4
*Making-up Roads	Tottenham Local Board	do.	do.
*Sewerage Works, Bushey	Watford U.R.S.A.	J. E. Worth	do.
Sewerage Works, Heath	Uttoxeter U.R.S.A.	Urban Smith	do.
*Asphalte Paving	Hove Commissioners	John Collyer	do.
		Official	Oct. 5

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Penmaenmawr Road Stone	Middlewich Local Bd.	*Official*	Oct. 5
*Distempering, &c.	Shoreditch Guardians	F. J. Smith	do.
*Lamp Columns, Manhole Covers, Gratings, Pails, &c.	Bethnal Green Vestry	*Official*	Oct. 6
*Builders' Work in Engine House, &c.	Corporation of Derby	Bramwell & Harris	Oct. 10
Sewerage Works (Contract No. 3)	Idle Local Board	W. B. Woodhead & Son	do.
*Hospital, West Derby	The Committee	C. O. Ellison & Son	do.
*Workshop at Boys' School	Walthamstow Sch. Bd.	W. A. Longmore	Oct. 11
Road Works, Horrabridge	Devon County Council	E. H. Harbottle	Oct. 26
Additions and Alterations, "High House," Morpeth	C. G. Rayne	Freeman & Robins	No date
Entrance Lodge, Fences, &c.	Pontypool Recreation Ground Company	D. M. Llewellin	do.
House and Shop, Featherstone, Leeds		R. J. Smith	do.
Factory, Stables, &c. Wade-yard, Leeds	Eastmans, Limited	J. Charles & Sons	do.
Four Shops and Premises, Newcastle-on-Tyne		B. Tomlinson	do.
*Laying, &c. York Paving &c		Surbiton Dist. Surv.	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
Surveyor and Inspector of Nuisances	Potterspury (Stony Stratford) R.S.A.	100*l.*	Sept. 28
*Surveyor's Principal Clerk	Bermondsey Vestry	100*l.*	Sept. 0
*District Surveyor	Lancashire C. C.	200*l.* &c.	Oct. 7
*Manager of Waterworks	Ipswich Corporation	150*l.* &c.	Oct 8
*Second Class Assistant Surveyor	Civil Service Com.		Oct. 13

Those marked with an Asterisk (*) are advertised in this Number. *Contracts, pp.* iv., vi., & viii. *Public Appointments, p.* xxi.

was only thirty-seven years old.——Eugène Gonon, the founder, has just died in Paris at the age of eighty. He represented one of the most interesting and honourable types of the Industry of Art. He produced some very large works in *cire perdu*. One very well known was the bas-relief of Dalou, "Mirabeau aux États Généraux," which now decorates the Chamber of Deputies, and to which he devoted the last seven years of his life. He was in his way a true artist, and an indefatigable worker.——The Académie des Inscriptions et Belles Lettres has just allotted to M. Tontain, member of the French school of Rome, the funds necessary to continue his excavations in Chemton, in Tunisia, where he has already brought to light almost the whole of a theatre and part of a forum.——It is a happy idea of the Municipal Council of Paris to give the names of celebrated architects to some of the streets. A new street in the Mairie of the Tenth Arrondissement is to be called Rue Hittorf, and two others, Rue Boffrand, and Rue Pierre Bullet. This last architect built the gates of St. Denis and St. Martin. ——Last Tuesday the statue of Général Kellermann was inaugurated at Valmy.——A large Salle des Fêtes has just been commenced in the Place des Halles at Brest. It is to be very highly ornamented, and will be inaugurated next year by the President. ——A very curious subterranean gallery has been lately discovered at Taverny (Seine-et-Oise); it is about 500 or 600 mètres long, and is hewn out of the solid gypsum; it is situated about 60 mètres under the forest of Montmorency.

DARMSTADT.—The competition for the design of a new museum has been decided. One of the first premiums fell to Herr Neikelmann, a Dane, resident in Stuttgart, the other was awarded to Messrs. Schmieden & Speer, of Berlin. There were five invited competitors and fourteen uninvited candidates. Among the latter were Professor Hubert Stier (Hanover), and Bruno Schmitz, of Berlin. The first prizemen had been invited, together with Professor Thiersch (Munich), Herr O. Sommer (Frankfort), and Herr W. Manchot (Mannheim). The cost of Herr Neikelmann's design is estimated at 75,000*l.*

MISCELLANEOUS.

ARCHITECTURAL ASSOCIATION CONVERSAZIONE.—The annual conversazione of the Association will take place on Friday, October 7, at the Imperial Institute. The subway from Kensington Station, by permission of the District Railway Company, will be open for the use of visitors.

AMALGAMATION OF FIRMS.—We are informed that the firm of John Freeman & Sons, and the West of England Granite Company have amalgamated, and will in future be known as John Freeman, Sons, & Company, Limited. It is not the intention of the company to offer the shares to the public. The offices of the late firm of John Freeman & Sons, at Penryn, Cornwall, will be the head office of the new company, and the management will be in the hands of Messrs. Freeman and their staff.

THE ENGLISH IRON TRADE.—With the exception of the steel-nail branch, there has been no notable addition to the orders received in any of the various departments of the English iron and steel trades. Both pig and manufactured iron exhibit little vitality, and lower prices rule for the latter. In steel generally little is doing, but in the north-west the Barrow Hematite Steel Company has received orders for nearly 26,000 tons of rails during the past week. Shipbuilders and engineers are quiet. The coal trade lacks animation.—*Iron.*

THE SLATE TRADE.—The slate trade continues to improve as the season advances, and is likely to continue very brisk in Carnarvonshire, though there may be a slight lull in Merionethshire when German shipments cease for the year. Our forecast in January has been fully borne out, the present demand not having been equalled for the last fifteen years, and it would be well for consumers to give as long notice as possible of their requirements, as the custom of buying from hand to mouth is likely to lead to disappointments and delay in the present state of trade.

COOKING APPARATUS.—Messrs. Comyn Ching & Co. have just completed an extensive set of cooking apparatus for the staff at the new Parcel Post Depot, Mount Pleasant. The kitchens of the various departments are fitted up with their latest improvements in steam and other cooking appliances, including several of their newly-invented apparatus for producing large quantities of fresh boiled water, by steam, for tea-making, &c.

OLD HOUSES IN BERMONDSEY-STREET. — The block of seven wooden houses standing on the eastern side of the street, numbered 88-91, 93-6, and reputedly 350 years old, is condemned, and will shortly be pulled down. They are four stories high, and have eight gables. Of late years the upper two floors have served for a woolstapler's business. The visitor should not fail to go into the two court-yards, and view the houses from the back. In one of the yards are three smaller houses, apparently as old, which, we are told, will share the fate of the rest.

TYLOR'S PEDESTAL VALVE CLOSET.—In reference to our remarks on page 207 *ante*, Messrs. J. Tylor & Sons write:—"We quite admit what you say about the dust which might form inside our patent 'Column' closet, and three months ago we brought out our '1892 pattern,' which quite overcomes this objection, as the shield is now continued round the back, in front of the outlet of the basin. The joint between the basin and the trap is undoubtedly *above* the trap, although it is below the top of the water-line in the basin. The reason our patent 'Pedestal Valve' closet does not require a small supply cistern (by which we meant a waste-preventing cistern), is that it is flushed by our patent Regulator Valve which is fixed to it, and can be supplied from any pipe. This valve makes the closet quite noiseless in action,—a great advantage when it is fixed in private houses. It is also a waste-preventer."

MEMORIAL TO THE LATE ARCHBISHOP OF YORK.—The sum of 800*l.* has been raised for a memorial in Peterborough Cathedral to Dr. Magee, the late Archbishop of York, and the committee have accepted the design of Mr. Pearson, R.A., for the cenotaph. The sculptor commissioned to execute the memorial is Mr. James Forsyth, of Hampstead.

SOUTH SHIELDS MASTER BUILDERS.—The members of the South Shields Master Builders' Association held their twenty-seventh annual meeting on the 14th inst. in the ante-room of the Free Library Hall, Mr. F. B. Dobson in the chair. The following officers were elected for the ensuing year:—Mr. S. Sherriff, chairman; Mr. T. S. Winter, vice-chairman; Mr. D. Lawes, treasurer; Mr. Jas. S. Wilson, secretary. Committee: Messrs. P. Marshall, F. B. Dobson, Jas. Young, R. Harper, and W. J. Robertson. Auditors: Messrs. G. Pollard and W. Yellowby. The meeting terminated with a vote of thanks to the retiring officers.

PROPOSED CITY IMPROVEMENTS, EDINBURGH.—The Town Council of Edinburgh have under consideration a scheme of city improvements involving an approximate cost in the aggregate of 138,000*l.* The proposals include the construction of a new bridge in place of the present unsightly and contracted North Bridge, and the widening of the thoroughfare onward to Hunter-square from a width of 50 ft. to 80 ft. This proposal was objected to on account of the expense involved, and on a division the motion was lost. Another proposal of a similar nature, the widening of Earl Grey-street by throwing back the east side to a uniform breadth with the Lothian-road, was also negatived on the score of cost. An alternative scheme for making a new street from Fountainbridge onwards towards Lochrin to relieve the traffic at Earl Grey-street, was favourably entertained. This new thoroughfare would pass through certain slum property, and it was suggested that the sites acquired should be utilised for the erection of dwellings for the working classes. A proposal for the acquisition of the block of buildings between MacEwan Hall and Bristo-street received general approval. The removal of this block of buildings will not only widen a narrow and much-used thoroughfare, but will open out to view the fine group of buildings comprising the new hall, medical class-rooms, students' union, musical class-rooms, &c. A suggestion was made that the principle of "betterment" should be applied to the buildings forming the east side of the street, which will be greatly improved in value by the clearance to be made. It was agreed to take power to widen the thoroughfare at Salisbury-place by acquiring the property at the south side of it, but as it was hinted that the proprietors might be exacting in their demands, an alternative scheme was brought forward for making a relief street by opening up Newington-place, which is at present a *cul-de-sac*, and continuing a street to Causewayside, onwards to the eastern extremity of Grange-road. The widening of a small portion of the street at the south back of Canongate met with approval, as also did several other minor schemes. The Town Council seem to have been greatly swayed by economical considerations, but the experience gained by the last improvement scheme leads to the conclusion that true economy is not the result arrived at by being chary in acquiring property that is not absolutely necessary. Some property which might then have been properly acquired has been enormously increased in value, and unless the principle of "betterment" is brought into play, such will be the case if the present scheme is carried out in the tentative manner proposed. When applying to Parliament for powers to carry out the improvement scheme, the question of acquiring power for the amalgamation of Leith and Portobello with the municipality of Edinburgh has been mooted. Considerable friction is apt to arise between the separate Town Councils as to tramways, water and gas supply, &c., which would be obviated by the amalgamation of the three bodies. If this were done, then would arise the question of new municipal buildings, a contingency which must be faced sooner or later.

THE METAL PRODUCTION OF RUSSIA.—According to official statistics for 1889, just issued, the production of metals in Russia was as follows:—Gold, 1,105,880 oz. alluvial, and 90,560 oz. metallic; platinum, 84,630 oz.; silver, 445,124 oz. in ingots; lead, 570 tons; copper, 4,725 tons in regulus; zinc, 3629 tons; tin, 12 tons; iron, 728,714 tons of pig-iron, of which 70 per cent. were smelted by charcoal; Steel, 254,770 tons. The total number of workmen employed in the Russian mining and metallurgical industries was 416,836, out of whom 43,275 were employed in the coal industry, whilst the steam force used in the same covered 120,000 horse-power.

NEW PONTOON DOCK AT NORTH SHIELDS.—On the 19th inst. the opening took place of the new pontoon dock constructed for and by Messrs. Smith's Dock Company, North Shields. The screw-steamer *Dauntless*, of Newcastle, was fully placed

upon the structure, the dimensions of which are 335 ft. in length, 67 ft. in breath, 8 ft. depth of pontoon, and 37 ft. 6 in. depth of side. The lifting capacity of the dock is 3,000 tons. It is divided into twenty-four water-tight compartments. The pontoon can be given a list either outwardly or inwardly of 6 in. The valves are worked entirely by hydraulics. The pontoon is fitted with four 22-in. centrifugal pumps. The engines were built by Belliss & Co., engineers, Westminster, and are vertical compound direct acting of 150 nominal horse power, with cast-iron standards at back and forged steel columns at front. The boilers were by Eltringham & Co., South Shields, and are 100 lbs. pressure. Mr. Dykes, consulting engineer, superintended the construction of the engines.

THE ALHAMBRA ALTERATIONS AND DECORATIONS.—The partial reconstruction of the Alhambra Theatre, London, was entered upon eight weeks ago, the designs having been before the Board of Directors for more than a year. The grand circle balcony has been advanced 6 ft. into the house, giving more seating and passage room. The private boxes, formerly twelve, have been reduced to ten, but two of the number have been enlarged. The alterations involved relighting and redecorating. The decorative tone is kept cream, white, and gold, with a little grey blue to relieve it. The frieze above the mirror panelling is a heavy raised material decorated specially for the work, the mirror panelling has been carried round the two ends of the circle to complete the whole. The ceiling has been levelled with fibrous plaster to hide the girders which intersected it, and painted a light blue with gold stars. The fronts of the balconies and proscenium have been redecorated, and the private boxes draped with amber brocatel. The iron columns are covered with a raised gilded material, and the panels of the doors of the private boxes are filled with a similar material. The foyer has also been redecorated in the same manner. The five window spaces have been filled with Arabesque screens and stained glass, having electric lights behind them. The upper circle balcony and bar, on the second tier, and the two staircases have been renovated, whilst the grand circle staircase and entrance-hall to private boxes and stalls have been redecorated. The theatre has been recarpeted and upholstered in colours and material to suit the general scheme. Electroliers, made in hammered metal, and finished in silver and gold ormolu, have been placed round the balcony fronts. The whole of the lighting work, including the new electrical plant at the rear of the theatre, has been carried out by Messrs. B. Verity & Sons; the decorations are by Messrs. Campbell, Smith, & Co.; the plastic ornamentation is by Messrs. Jackson; the iron, stone, and brick construction by Messrs. Whitehead & Co.; the carpets by Messrs. Lapworth & Harrison; and the upholstery by Messrs. Shoolbred. The works have been carried on under the supervision of the architects, Messrs. Clark & Pollard.

SLOPER'S PATENT FOLDING SEATS.—These seats, of which a specimen has been sent to our office, are contrived so that the legs and back fold up flat against the plank which forms the seat, so that a number can be packed and put away in a small space, or can be piled easily in a cart for carriage. The legs are designed with an upright piece which, when the legs are down, projects above the top of the seat and clips the supports of the back so as to hold them firmly. The legs, which when not in use fold inward towards the centre of the seat, are when in use kept stiff by a thick brace-piece hinged against the underside of the seat, which, when the legs are extended, is turned on its hinge and clips into metal clips on the legs, forming at once a tie and a strut, so that the legs cannot give in either direction. The whole seat is easily got into position, and perfectly firm when all the clips are in. Mr. Sloper sends us drawings of folding-tables made on the same principle. We have not tested these, but the seat is a thoroughly satisfactory thing of its kind, and should be very useful.

GLASGOW ARCHITECTURAL ASSOCIATION.—A visit was paid on the 17th inst. by a party of the members of the Glasgow Architectural Association to Mugdock and Bardowie Castles, by kind permission of the occupiers. A meeting was also held in the rooms, 114, West Campbell-street, on Tuesday evening, the President in the chair. Mr. Wm. Fraser, A.R.I.B.A., read a paper on "Domes and their construction." After dealing with general points of construction, he noted the chief features of interest in the following domes, viz., the Pantheon, St. Sophia, the Duomo, Florence, and St. Paul's, London. Mr. Robertson opened the discussion which followed.

CAPITAL AND LABOUR.

THE PLASTERERS' STRIKE AT NELSON, LANCASHIRE.—The plasterers at Nelson and Colne, Lancashire, who have been out six weeks, have resumed work, the masters agreeing to advance their wages from 7½d. to 8d. per hour.

JOINERS' AND CARPENTERS' STRIKE, LANCASTER.—The joiners and carpenters' strike at Lancaster, which has lasted nearly eleven weeks, has been settled, and the men are to receive a half-penny per hour advance.

MEETINGS.

SATURDAY, SEPTEMBER 24.

Liverpool Engineering Society.—Visit to the Liverpool Overhead Railway Works, and the Liverpool Hydraulic Power Company's Works.

SATURDAY, OCTOBER 1.

Architectural Association.—Visit to St. Alban's Abbey, St. Michael's Church and Gateway. Mr. James Neale, F.S.A., will act as guide. Train leaves at 2.5 p.m. from St. Pancras.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

13,262.—WATER-CLOSETS: *H. B. Thornton.*—This invention relates to improvements in disinfectants for water-closets and the like. It consists in a disinfecting preparation composed of chloride of lime, permanganate of potash, or other disinfectant, and paraffine wax or a substitute therefor, such as sulphate of calcium or any cement-forming substance or pumice stone, which can retain the disinfectant until a flush comes and carries away a portion without prejudicially affecting its qualities. The inventor forms balls, squares, or other suitable shapes of the chemical with a small addition of the paraffine wax or its equivalent, intimately blending the latter with the former by melting, dissolving, impregnation, or other means.

16,692.—BRICKS, &c.: *J. Davies.*—This invention relates to the manufacture of bricks, tiles, and other such like articles from slate *débris*, or slate refuse, in combination with silica and asphalte. For this purpose the slate is ground up into a fine state by edge-runners, disintegrators, or other suitable machinery, then mixed with the silica and asphalte, and the material thus combined is subsequently manufactured into bricks, tiles, &c., by any of the means or machinery capable of making the combined material into the required articles. Lime in some instances may be added.

16,899.—LAVATORIES, &c.—*E. J. Preston and F. G. S. Ham.* These improvements mainly refer to the supply of water to lavatories and water-closets and to the efflux therefrom, with a view to economy in the manufacture, the prevention of waste of water, and the avoiding of the escape of sewer-gas from the drain side. For the purpose of supplying water to lavatory-basins the inventors provide a supply cistern of a size suitable for one charge, and with a syphon-pipe having its inlet near the bottom of the cistern, and the down or outlet pipe passing through the said bottom, while the ball-cock for charging the cistern is arranged somewhat above the bend or discharge level of the syphon, the bore or passage through the ball-cock being by preference sensibly smaller than that of the syphon and down pipe, the latter being provided at the basin with a suitable tap or valve, by preference self-closing. The basin is provided with overflow and waste appliances, which join below and preferably are trapped towards the drain.

17,006.—SANDING BRICKS: *J. V. Lange.*—The object of this invention is the construction of an apparatus which will thoroughly coat with sand the clay for making bricks, and the like, on the top, bottom, and sides thereof, as it issues from the pug mill, and presses the said sand into the clay to prevent it dropping off when the bricks are handled before burning. One or more cones, or cylinders with cones at one end, are provided on either side of the stream of clay as it issues from the pug mill. These cones or cylinders are fitted with stepped spirals round their peripheries, or other suitable means of distributing the sand. At the bottom of the apparatus is a trough to catch the surplus sand from the cones which does not adhere to the clay, and in this trough is placed a revolving drum fitted with vanes to throw the sand up to the bottom of the stream of clay. The apparatus is provided with a hopper to contain the sand, from whence it runs on to the cones or coned ends of the cylinders, and is thrown by the centrifugal action of the spirals over the sides and top of the clay. The cones or cylinders and the drum are mounted in suitable bearings on a frame, and caused to rotate at a high speed. Horizontal and vertical rollers are also provided to press the sand into the clay. The distributing cones, or cylinders, and drum are cased in to prevent loss of sand.

17,016.—DOORS: *H. Gardner.*—This invention has for its object to exclude dust and draughts, and also to prevent slamming and rattling of doors when closed. For this purpose the necessary parts of a door-frame against which the door usually presses when closed are provided with a box, or gutter-shaped plate, backed by a spring or springs to force the said plate outwardly when the door is open, but which spring or springs become compressed as the door is closing, the plate or plates being then in close contact therewith.

8,883.—WINDOW-SASHES: *F. J. J. Gibbons.*—This invention provides for raising or lowering a top sash of any size without using a centre line, a long arm, or a pull-down handle; raising the bottom sash without unfastening the top one; lowering the top sash without unfastening the bottom one, either sash being automatically secured by the act of closing only, the various parts of the raising, lowering, and fastening devices being beyond the reach of a burglar, and the lower sash being raised a short distance, so as to ventilate between the sashes, and automatically secured in that position from the inside. The details of the invention can only be understood by reference to the drawings.

10,801.—NAILS: *S. E. Groff.*—The object of this invention is to produce a machine which will take wire, cut it into suitable lengths, form heads and points upon each nail, and groove it spirally at the same time; also so as to produce nails adapted to be used either as nails or screws, and to produce nails more cheaply than has been done hitherto. We must refer our readers to the specification for further details, as they could only be mastered by reference to the drawings.

NEW APPLICATIONS FOR LETTERS PATENT.

September 5.—15,871, A. Bowie and W. Renison, Folding Steps, Ladders, &c.—15,882, J. Honeyman, Heating Greenhouses, Dwellings, and other Buildings.—15,910, F. Webster, Stoves, Grates, and Ranges.—15,920, N. Wilson, Grates for Open Fireplaces.

September 6.—15,934, J. Bilton, Decorating Pottery, Porcelain, Tiles, Bricks, &c.—15,997, W. La Grande-Bundy, Workmen's Time Recorders.

September 7.—16,040, W. Orr, Construction of Concrete Roofs and Floors for Buildings.—16,064, G. Jennings and J. Morley, Supplying Water to Closets and other places.—16,067, J. O'Rourke, Caissons.

September 8.—16,083. W. & J. Cross, Door Locks and Latches.—16,091, G. Briggs, Building Blocks or Bricks.—16,119, F. Perry, Water-waste Preventers for Flushing Purposes.—16,121, M. Demez, Veneering Wood.

September 9.—16,151, E. Harvey, Water-closets.—16,165, W. Denn, Plasterers' Laths for Ceilings, Walls, or similar structures.—16,174, P. Bramwell, Fastener for Window-sashes, &c.—16,178, J. Moore, Grates and Stoves.—16,180, T. Horaford, Window-sash or like Fastening.—16,185, H. Rongier, Coupling Device Applicable as a Window-fastener, &c.

September 10.—16,211, W. Murray and J. Macintyre, Kilns for Pottery, Bricks, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

13,628, F. Jones, Window Sash-fasteners.—14,053, E. Ulricks, White Colouring Matter or Paint.—14,914, J. James, Chimney-pot or Chimney-pot Attachment, also applicable as a ventilator.—15,141, J. Andrew, Reciprocating Saws.—15,214, J. McGraw, Chimney-tops.—15,330, F. Belville and E. O'Neill, Cowls.—15,340, J. T. and J. Vicars, Bakers' Ovens.—15,548. W. Steel and C. Braham, Sash-fasteners.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

15,632, M. Bithorn, Sliding Step-ladder.—18,954, F. Tyers and O. Barnsdale, Boilers for Kitchen Fireplaces or Ranges.—19,467, J. Bloomfield, Plaster.—7,895, T. Baylis, Paving Bricks, Paving Tiles, and Quarries.—12,822, J. Glover and W. Stevens, Slow-closing Valves for Water-closet Tanks.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 13.—By *Blake, Haddock, & Carpenter*: 354, London-rd., Thornton-heath, f., 1,850*l.*; 350 and 352, London-rd., f., r. 115*l.*, 1,970*l.*; A f. cottage in Alma-pl., 330*l.*; A plot of f. building land, 72*l.*; an enclosure of meadow land, 5a. 3r. 10p., f., 2,630*l.*; f.g.r. of 12*l.* 12s., Type-st., Bethnal-green, reversion in 58 yrs., 250*l.*—By *Ball, Norris, & Hadley*: 37, 39, and 41, Lambeth Palace-rd., Lambeth, u.t. 38 yrs., g.r. 24*l.*, r. 136*l.*, 1,025*l.*; 27, Crozier-st, u.t. 36 yrs., g.r. 6*l.* 15s., 365*l.*

SEPTEMBER 14.—By *J. W. Coade*: 56, York-st., Lambeth, u.t. 30 yrs., g.r. 7*l.* 10s., r. 36*l.*, 270*l.*; 1 and 3, Eddystone-rd., Brockley, u.t. 85 yrs., g.r. 11*l.*, r. 54*l.* 12s., 285*l.*—By *Slade & Butler*: 16, Regina-rd., Finsbury Pk., f., 460*l.*; 121, St. James' rd., Holloway, u.t. 42 yrs., g.r. 5*l.* 5s., r. 31*l.*, 200*l.*; 38, Scylla-rd., Peckham, u.t. 74 yrs., g.r. 6*l.*, r. 30*l.*, 220*l.*; 43, Dilston-grove, Rotherhithe, u.t. 58 yrs., g.r. 5*l.*, r. 26*l.*, 185*l.*; 44 and 45, Dilston-grove, u.t. 58 yrs., g.r. 10*l.* 10s., r. 53*l.* 6s., 395*l.*

SEPTEMBER 15.—By *W. Bradly*: F.g.r. of 5*l.*, Vance-st., New-cross, reversion in 56 yrs., 124*l.*; f.g.r. of 12*l.*, Maltby-st., Bermondsey, ditto in 46 yrs., 295*l.*; f.g.r. of 11*l.* 11s., Railway-ter., Ladywell, ditto in 71 yrs., 234*l.*—By *Newson & Co.*: 10 and 11, Colina-rd., Tottenham, u.t. 88 yrs., g.r. 12*l.*, 240*l.*; 53, Cumberland-market, and 100, Little Albany-st., Camden-town, u.t. 32 yrs., g.r. 9*l.* 10s., 335*l.*; 1 and 2, St. Ann's-pl., Stamford-hill, f., r. 61*l.*, 720*l.*; 1 and 2, Sherboro'-villas, f., 590*l.*; 29, Bolsover-st, Marylebone, u.t. 32 yrs., g.r. 6*l.*, r. 75*l.*, 670*l.*; 3 and 4, Carburton-st., u.t. 32 yrs., g.r. 14*l.*, r. 145*l.*; 1,065*l.*—By *Wilkinson, Son, & Welch* (at Brighton): A plot of land, area 3,300 ft., f., Queen's-rd., Brighton, 2,200*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0/0	0/0/0
Teak, E.I... load	9/10/0	18/0/0
Sequoia, U.S.ft.cu.	2/4	3/0
Ash, Canada load	2/10/0	4/0/0
Birch, do.	3/5/0	4/10/0
Elm, do.	3/10/0	4/15/0
Fir, Dantzic, &c.	1/10/0	3/10/0
Oak, do.	3/0/0	5/5/0
Canada.....	5/10/0	7/0/0
Pine, Canada red	2/10/0	3/10/0
Do, yellow	2/10/0	5/0/0
Lath, D'ntzic, fath	5/0/0	6/0/0
St. Petersburg	5/0 0	7/0 0
Deals, Finland		
2nd & 1st std 100	7/10/0	9/10,0
Do, 4th & 3rd..	7/0/0	8/0/0
Do. Riga	6/10/0	8/0/0
St. Petersburg, 1st yellow ..	10/10/0	14/10/0
Do. 2nd yellow	8/0/0	9/10/0
Do. white	7/0/0	9/10/0
Swedish	7/0/0	16/0/0
White Sea ...	8/0/0	17/0/0
Canada, Pine 1st	20/0/0	26/10/0
Do. do. 2nd....	14/10/0	18/0/0
Do. do. 3rd, &c.	7/10/0	10/0/0
Do. Spruce. 1st	8/10/0	11/0/0
Do. do. 3rd & 2nd.....	6/5/0	8/0/0
New Brunswick	6/10/0	7/0/0
Battens, all kinds	3/10/0	15 10 0
Flooring Boards, sq., 1 in. prep. 1st	0/3/0	0/13/0
Do. 2nd.....	0/7/0	0/10/0
Other qualities	0/3/0	0/7/6
Cedar, Cuba ..ft.	/3½	/4½
Honduras, &c.	/3½	/4
Mahogany, Cuba.	/4½	/6½
St. Domingo, cargo av	/4	2/0
Mexican do. do	/4	/5
Tobasco do. do	/5½	/7
Honduras do..	/5½	/6½
Box, Turkey ton	4/0/0	12/0/0
Rose, Rio.....	10/0/0	20/0/0
Bahia	9/0/0	18/0/0
Satin, St. Domingo ....ft.	0/0/7	0/1/3
Porto Rico	0/0/7	0/1/6

TIMBER (*continued*).		
Walnut, Italian..	0/0/3½	0/0/7
METALS.		
IRON—Pig, in Scotland .....ton	2/1/4½	0/0/6
Bar, Welsh, in London.....	5/17/6	6/0/0
Do. do, at works in Wales	5/7/6	5/10/0
Do. Staffordshire, in London	6/5/0	6/15,0
COPPER—British, cake and ingot	47/0/0	0/0/0
Best selected ..	48/0/0	0,0/0
Sheets, strong..	55/0/0	0/0/0
Chili, bars	43/17/6	44/0/0
YELLOW METAL lb.	0/0/4½	0/0/5½
LEAD — Pig, Spanish ....ton	10/2/6	10/3 9
English, com. brands	10/5/0	10/7/6
Sheet, English, 8 lbs. per sq. ft. and upwards ..	11/10/0	0/0,0
Pipe	12/0/0	0/0,0
ZINC — English sheet .....ton	24/0/0	0/0,0
Vieille Montagne.....	24/10/0	0 0,0
TIN—Straits	91/17/6	92/7/6
Australian	92/7/6	92/17/6
English Ingots.	95/0/0	95/10/0
Banca	94/0/0	0/0/0
Billiton	92/10/0	0/0/0
OILS.		
Linseed .....ton	17/15/0	17/17/6
Cocoanut, Cochin	24/10.0	0/0/0
Do. Ceylon	21/10/0	21/15'0
Palm, Lagos	24/0/0	0/0,0
Rapeseed, English pale	23/10.0	24/0/0
Do. brown	22/0.0	22/5/0
Cottonseed ref...	18/10/0	0/0/0
Oleine	20/10/0	21/0/0
Lubricating, U.S.	4/0/0	5/0 0
Do. refined	5/10/0	12/0/0
TAR—Stockholm barrel	0/12/6	0/0/0
Archangel	0/12/6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

BLACKPOOL.—Accepted for brickwork in connexion with the Blackpool Tower buildings. Messrs. Maxwell & Tuke, architects, Manchester:—

Cardwell Bros., Blackpool £7,832 8 4

BROADSTAIRS.—For the erection of a detached house, Rectory-road, Broadstairs, Kent, for Mr. Frank King Cochiam. Mr. William A. Burr, architect, 65, Chancery-lane, W.C.:—

Paramor & Son	£1,700	Martin ..	£1,199
Oldrey	1 450	Brown & Eon	1,150
May	1,285		

CHADWELL HEATH (Essex).—For the erection of a dwelling-house on the Whalebone Estate, Chadwell Heath, Essex, for Mr. Geo. Smith. Mr. Geo. Stooke, architect, Forest Gate, E.:—

Wilmot & Son	£375 0 0	Bowen	£217 10 0
Booth	369 0 0	Taylor	216 7 6
Blatch	237 0 0	Hovell	213 12 0
Scott	225 0 0	Algar*	209 18 4
Gomme	218 10 0		

* Accepted.

HANLEY.—For the erection of a shop and house, Lichfield-street Hanley, for Mr. J. Swinnerton. Mr. Elijah Jones, architect, 10, Albion-street, Hanley. Quantities by the architect:—

C. Cope	£440 0	C. Cornes	£370 0
T. Godwin	414 0	A. Ward	355 0
Ogden & Banks	389 0	A. Hall, Hanley*	310 0
T. K. Tildesley	383 10		

* Accepted.

HATFIELD.—For constructing an additional service reservoir, at the Waterworks, Hatfield, for the Marquis of Salisbury, K.G. Mr. G. M. Lawford, engineer, 13, Victoria-street, Westminster:—

John Mowlem & Co.	£386 0 0
B. Ward & Co., 15, Great George-street, S.W.*	330 0 0

* Accepted.

HORSELL (Surrey).—For the erection of detached house, Horsell, Woking, for Mr. Pierce. Messrs. Pooley & Follett, architects, 21, John-street, Aldelphi, W.C.:—

Bedford Park Stores, Lim., Building Department	£1,755	J. Harris & Sons	£907
Martin Wells & Co.	975	G. Thomson	775
J. F. Collinson	939	S. Chafen, Rotherhithe	729
Simmonds Bros.	915	Serff Bros. & Co., Chiswick*	587

* Received too late.

LEEDS.—For the erection of two houses at Armley, for Mr. Joseph Procter. Mr. F. W. Rhodes, architect, Upper Wortley, Leeds:—

Builders—Jno. Wilby & Son	£207 0 0
Joiner—J. E. Oates	90 0 0
Plumber—W. Broadbent	19 0 0
Plasterer—A. Marsden	26 5 0
Slater—J. Atkinson	16 10 0

LEYTON.—For repairs and reinstatements to the "Beaumont Arms," Beaumont-road, Leyton, for "The New London Brewery Co." Mr. William J. Ingram, architect, 44, Theobald's-road, Bedford-row, W.C.:—

W. Rowe	£175 0 0	Mid-Kent Building Company	£106 0 0
White & Co.	165 0 0	Sayer	92 0 0
J. Knight	114 17 0		

LONDON.—Revised tenders for the erection of three warehouses in Buck's row, Whitechapel, E., for Messrs S. Schneiders & Sons. Messrs. Wigg, Oliver, & Hudson, architects, 7, Bedford-row, W.C. Quantities by Messrs. Franklin & Andrews:—

Macey & Son	£16,980	J. Brown, Son, & Blomfield	£13,100
Higgs & Hill	16,500	Garlick & Horton (Ltd.)	12,900
Killby & Gayford	13,870	J. Richardson	12,667
Glover & Son	13,848	J. Bentley	12,597
Walker Bros	13,370	W. Gladding, Baker's-row, Whitechapel, E.*	12,495
W. Downs	13,320		
J. & H. Cocks	13,248		

* Accepted.

LONDON.—For alterations to "Volunteer" public-house, Upper Baker-street, for Mr. W. D. Schwarz. Mr. T. Durran, architect:—

F. Corbett	£451	H. C. Clifton	£370
J. Myring & Co.	405	J. Edgar	365
C. Dearing & Son (accepted)	373	J. Higgs	347

LONDON.—For the erection of two shops at Lever-street, St. Luke's, for Mr. E. Jones. Mr. Alfred Allen, architect:—

Pickering	£1,080	Dearing & Son	£916
Archer	1,050	Thomson	880

LONDON.—For the erection of a house at Willesden. Mr. C. Granville Baker, architect, 5, Bloomsbury-square, W.C. Quantities by Mr. C. J. Ford, 4, Mitre-court, Fleet-street, E.C.:—

J. Freeman	£2,264 17 3	J. & S. Bowyer	£1,848 0 0
Binder & Co.	1,928 0 0	J. Allen & Sons	1,835 0 0
Tennant & Co.	1,887 0 0	Cowley & Drake*	1,795 15 0

* Accepted.

LONDON.—For alterations and additions to the Islington Relief offices, Highbury-mews, N., for the Guardians of the Poor of the Parish of St. Mary, Islington. Mr. William Smith, architect, 65, Chancery-lane, W.C.:—

Bellew	£200 5	Brass & Son	£136 10
Whitehead & Co.	180 0	Norris & Luke	121 0
Linfield	170 0	Lown & Son	117 0
Ward & Lamble	148 0	Kershaw	116 0
Ruffell	140 0	Chas. Coote	114 3
Harvey	138 0	White & Son	112 0
Marchant & Hirsk	137 7	Stevens Bros.*	107 0
Langham	137 0		

* Accepted.

LONDON.—For gas-fittings at "The King's Head," Upper Kennington-lane, S.E., for Mr. Sedgeley. Messrs. Treacher & Fisher, architects, 30, Coleman-street, E.C.:—

W. Winn	£130 0 0	J. Biggs	£126 18 0
Buckley & Leach	127 5 6		

NORTHFLEET (Kent).—For cemetery works, Northfleet. Mr. I. T. Walford, architect. Quantities supplied:—

W. J. Bottrill	£5,824 0 0	H. Carter	£5,076 14 0
W. Richardson	5,817 13 6	Trappett & Batley	5,001 14 7
Kirk & Randall	5,690 0 0	C. J. Slade	4,966 14 0
G. E. Wallace & Son	5,479 0 0	J. G. Nayler & Son	4,929 0 0
R. Avard	5,362 0 0	Multon & Wallace	4,833 0 0
M. C. Fenton	5,320 0 0	W. H. Rayfield	4,746 0 0
W. Tuffee	5,257 18 10	H. W. Martin*	4,509 3 7

*Accepted.

PLYMOUTH.—For the restoration of Kingston Church. First contract: Restoration of roofs. Mr. Edmund Sedding, architect, 7, Buckland-terrace, Plymouth:—

Delofield	£800	Pearse	£700
Farr Bros.	580	Lukecraft, Aveton Giffard*	680

* Accepted.

PONTYWAIN (Mon.).—Accepted for the erection of thirty-nine cottages at Pontywain and Maesycwmmer, Mon., for the Provident Association of London, Lim. Mr. G. Roser, architect, Abercarn:—Thomas Lawrence, Blackwood, Mon. £5,922 10 0

SOUTHPORT.—For alterations to premises at the corner of Lord-street and Neville-street, for the trustees of the late Thomas Dale. Messrs. A. W. Parry & Son, architects, 17, Market-place, Reading:—

J. Byrom	£2,798	Fairbridge & Hatch	£2,240
J. M. & G. Petrie	2,528	Wishart & Irving	2,229
Brown & Backhouse	2,444	Thos. Bridge, junr.	2,060
J. Hamilton	2,425	Holme & Green, Benson-street, Liverpool*	2,060
R. Neill & Sons	2,340		
G. Hutchins	2,259		

*Accepted.

TONBRIDGE.—For alterations and additions to a house in Dry Hill Park, Tonbridge, Kent, for Mr. Hugh O. Whitby. Mr. J. W. Little, architect. Quantities by Messrs. Ruault & Young:—

Mansfield & Sons	£4,561	Gallard	£4,131
Strange & Son	4,228	Pumnet & Son	3,998
Jones	4,140		

WALTHAMSTOW.—For the erection of three cottages, Walthamstow, N., for Mr. Richard Scully. Mr. John Groom, architect:—

G. S. Archer	£1,190	Good	£989
Dearing & Son	1,179	Reed	982
Fuller	1,075	Liscombe	917
S. J. Scott	1,045		

WHISTON.—For the erection of board-room and offices at Whiston Workhouse, Prescot, for the Prescot Board of Guardians. Mr. J. Gandy, architect, Masonic-buildings, St. Helens. Quantities by the architect:—

Jas. Almond	£2,796 0	Hughes & Stirling	£2,493 0
W. Molyneux	2,775 0	R. H. Davies, St. Helens*	2,298 10
P. Tickle	2,574 0		

* Accepted

WOOD-GREEN (Middlesex).—For the erection of a detached villa residence, Bounds-green-road, Wood-green. Mr. Jno. Farrer, architect 20, Finsbury-pavement. Quantities by architect:—

Wilkinson	£1,533	Martin & Co.	£1,457
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Evans	1,466	Pocock	1,395
F. Voller	1,465	H. Fagg	1,394

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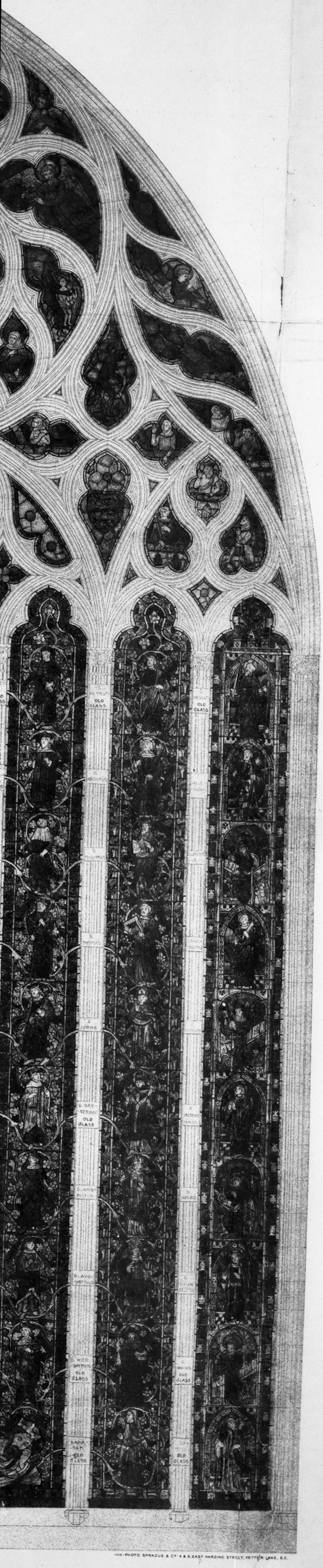

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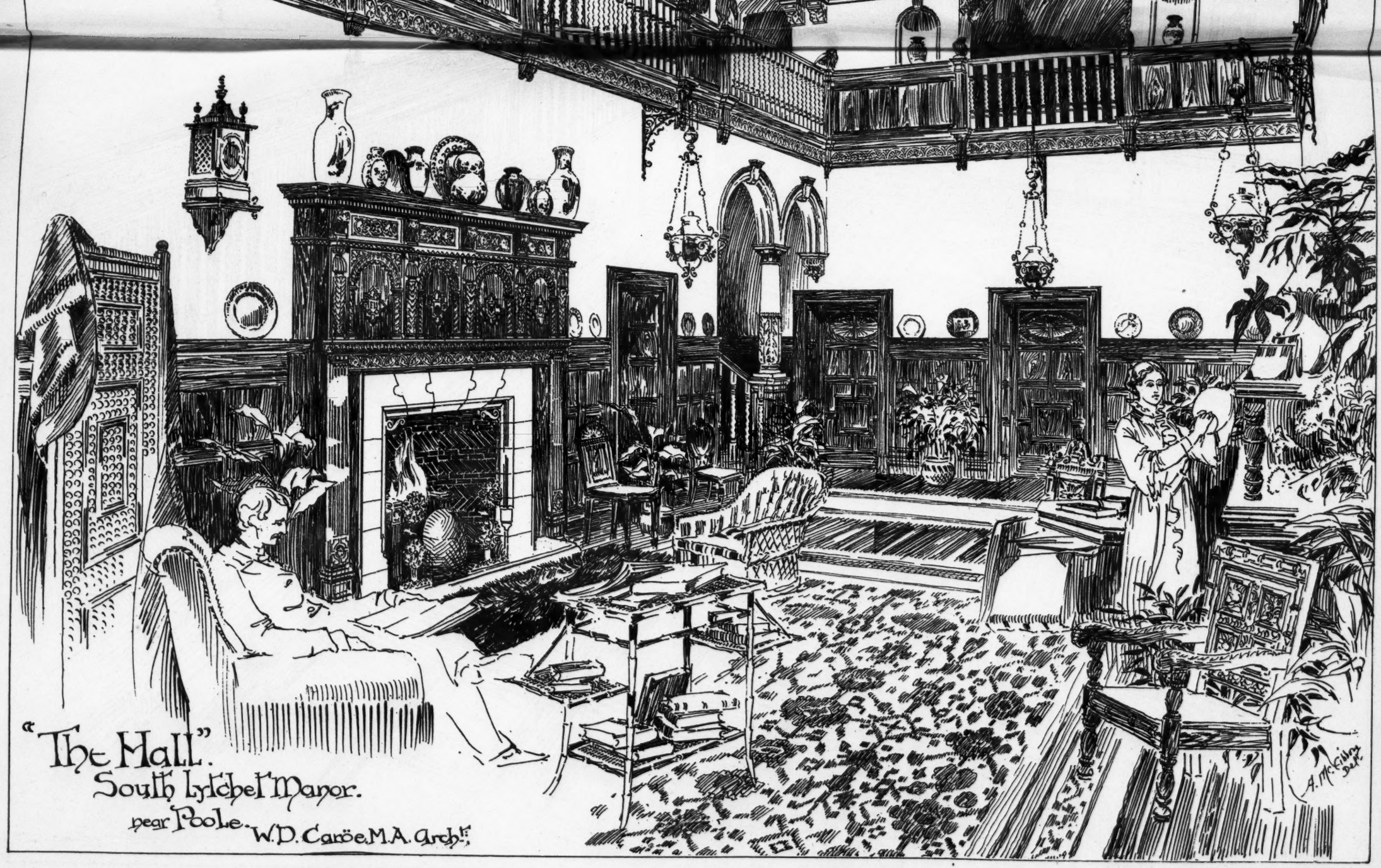

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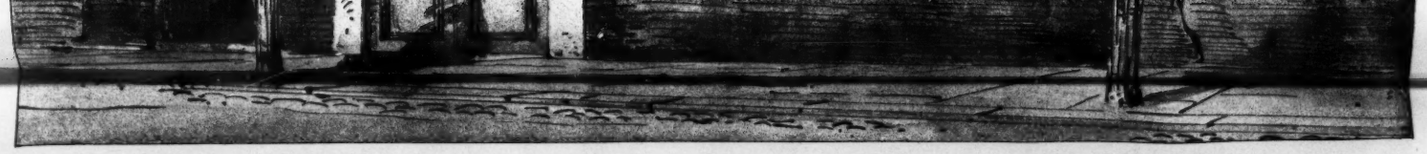

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